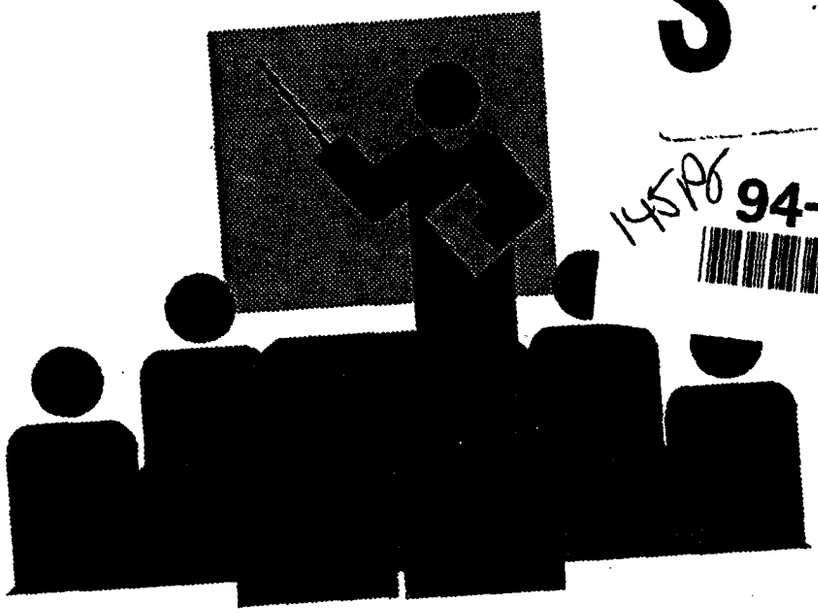
Organizational learning in the development of doctrine in the U.S. Army, 1976-1986: A historically-Based Study



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The purpose of this study is to examine the organizational learning dynamics of doctrinal change in the United States Army from 1976 to 1986, specifically, the formation and implementation of AirLand Battle doctrine. To provide overall direction to the study, seven broad questions were used: (1) Did the Army link inputs and processes to products, outputs, and outcomes? (2) How did the U.S. Army learn its requirement to change doctrine? (3) Who learned the requirement for the development of new doctrine? (4) How did the Army learn from its internal and external environment to determine required changes? (5) What were the interpretation systems, or interpretation processes to make meaning of information? (6) How did the Army store and retrieve its organizational learning? (7) What were the learning products of doctrinal change?

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CHAPTER I

Introduction

> In times of continuous and complex change, continuous learning is indispensable (Peccei, 1984, p. 42).
>
> To obtain the improvement in productivity which the post-capitalist society now needs (sic), the organization has to become both a learning and a teaching organization (Drucker, 1993, p. 92).

Can we, as societies, as organizations, as individuals, and as a world, solve our problems fast enough to ensure our own survival? Do we have the necessary collective learning skills to solve our problems in sufficient time? This is the "world problematique" that challenges us today (Botkin, Elmandjra & Malitza, 1979).

Examples of this challenge to learning and survival are the communist regimes which fell in Eastern Europe and the Soviet Union's dissolution after 1989. The world watched as entire nations began to learn new patterns of life. New values, in many cases directly opposite to the values they replaced, forced entire populations to unlearn old behaviors and act in concert with the espoused values of the new governments. Vaclav Havel, the past president of Czechoslovakia, stated, "we are going there to learn," prior

to a 1990 trip to the United States. The challenge of learning on a huge collective scale became evident.

Organizational learning has been assumed in organizational theory since the 1950s (Daft & Huber, 1987). The questions which open this chapter assume that "...groups of people learn, that organizations learn, and that even societies can be said to learn," (Botkin, Elmandjra & Malitza, 1979, p. 8). Daft and Huber (1987) cite the corporate history of American LaFrance corporation as an example of an organization which failed to learn and, therefore, failed to survive. Although there is potential disaster for organizations which fail to learn, organizational learning receives relatively little attention.

"Much research has been done on individual learning processes; hardly any research is done on organizational or group or societal learning. This is clearly a new research area," (Botkin, Elmandjra & Malitza, 1979, p. 137). The human resource development field, which has the implied corporate mission for learning, generally has focused on individual learning. Although HRD departments focus on learning, their true product is the increased productivity and organizational contributions gained from the learning process. Most training development or organizational development models have dealt with the organization only as a learning environment rather than as an entity which, itself, can learn (Dixon, 1990). Other than

the organization as a learning context, the requirement for organizational learning has been relatively ignored in terms of relationship to clients and society.

Yet the requirement for organizations to learn new ways of doing business becomes more apparent as our society becomes more complex and the rate of change accelerates. Some of the organizational learning requirements include reaching the goal of total quality management (Garvin, 1991), or the goal of customer orientation (Peters, 1984), or a better marketing focus (Kotler, 1985), and other processes to meet and succeed against global competitors in a rapidly changing environment. Conner (1992) asserts that not only is constant change present in the world and in corporate environments, but that the rate of change is increasing, thus putting additional pressure on organizations.

Nonaka (1991) described the knowledge-creating company, a form of a learning organization, as a model for Japanese success in a rapidly changing, fiercely competitive world. He states that "...few managers grasp the true nature of the knowledge-creating company - let alone know how to manage it," (p. 96). He further asserts that knowledge is a "sure source of lasting competitive advantage," (p. 96). Learning and knowledge sharing has been the preserve of the HRD department while line managers have focused on managing and making things happen. Thus, organizational learning became a potential means of corporate survival with the HRD

department generally responsible for corporate learning (Dixon, 1992).

Statement of the Problem

What are the organizational learning dynamics for any organization to learn a new conceptual model to accomplish its mission?

Purpose of the Study

The purpose of this study is to examine the organizational learning dynamics of doctrinal change in the United States Army from 1976 to 1986, specifically, the formation and implementation of AirLand Battle doctrine.

Research Questions

To provide overall direction to the study, seven broad questions will be used to guide the study:

1. Did the Army link inputs and processes to products, outputs, and outcomes? (This question is derived from the Kaufman (1988, 1992) Organizational Elements Model (OEM) which is explained in Chapters II (p.48) and IV (p.91)).

2. How did the U. S. Army learn its requirement to change doctrine? What motivated the Army to learn?

3. Who learned the requirement for the development of new doctrine?

4. How did the Army learn from its internal and external environment to determine required changes?

5. What were the interpretation systems or interpretation processes to make meaning of information?

6. How did the Army store and retrieve its organizational learning?

7. What were the *learning products* of doctrinal change?

Significance of the Study

This study is intended to provide insights into the dynamics of organizational learning in a very large, traditional, classic bureaucracy - the U. S. Army, and possibly provide guidance for the future. An important research task required to be accomplished is the documentation of actual learning practices in different types of organizations (Shrivastava, 1983). Armies, by their very nature, are perceived as traditional and stay

with successful past practices, instead of learning and changing with technology and other environmental factors. A study of history yields many examples of the negative consequences of failure to learn or of learning the wrong thing. For example, in 1940 France fell in a few weeks primarily because its army's doctrine did not meet the demands of modern combat (Doughty, 1985). France spent a large part of its national treasure to build the Maginot line which was negated by the German army's successful doctrine of maneuver. The successful tactics of the Napoleonic Wars caused untold number of deaths when applied in the U. S. Civil War against improved weapons technology. The U. S. lost hundreds of tons of shipping at the start of World War II because the Navy failed to learn from the British experience (Cohen and Gooch, 1989). Conversely, the Germans were very successful at the start of World War II in application of the lessons of previous wars and use of technology, as mentioned above.

The study also should have significance to business organizations. The same lessons of failure to learn are documented in the American LaFrance story, as the company's dominant position in manufacturing fire trucks was lost to a learning competitor and the business failed (Daft & Huber, 1987). The application of doctrine in the Army may be generalizeable to business organizations as an analog to changing methods of doing business and possibly, strategic planning. Just as the Army adopted AirLand Battle doctrine

to accomplish its mission, so too, have organizations adopted new methods, such as total quality management, to accomplish their mission of remaining competitive. Some of the Army's experiences with implementing AirLand Battle doctrine may have great relevance for business organizations implementing change.

From a societal viewpoint, this study should prove beneficial because it documents the thinking process that creates the conceptual underpinning for waging warand winning. The size of the Army, the acquisition of Army materiel, and other major items that comprise the costs of having an Army generally are based on the Army's doctrinal concepts. It is important that a democratic society understand the envisioned conceptual nature of war that the citizenry must pay for and that its sons and daughters may be asked to fight.

Rationale to Study Organizational Learning

Organizational learning is discussed as a major potential competitive capability for corporate survival (De Geus, 1988; Stata, 1989) or a key element to strategic performance (Fiol and Lyles, 1985). "In fact, I would argue that the rate at which organizations learn may become the only sustainable competitive advantage, especially in knowledge-intensive industries." (Stata, 1989, p. 64) The

concept is perceived as important, perhaps critical, and the business world is seeking applications. Perhaps organizational learning is the linkage to the "information-based organization" that Drucker (1988) states is the next evolution in business structure. There is discussion of the "learning organization" as the structure of the future (Galagan, 1989).

An additional impetus to study organizational learning is the generally poor past showing by certain American industries (for example, auto, semiconductor, consumer electronics) during the turbulence and the increased global competition of the past decade. The postwar period was relatively stable and provided no impetus for change by American firms (Hedberg, 1981; Conner, 1992). Some organizational change and learning theorists believe that learning will not start until a sufficient external force hits the organization and forces a recognition that new methods of behavior are required (Meyer, 1982; Conner, 1992)). Thus, there is an increased search for new insights on organizational learning. The Human Resource Development (HRD) field traditionally has dealt with individual learners. Most HRD activities have focused on the individual learner within the context of the organization; however, little has been done in looking at the aspect of organizational learning as a context shaping learning activities.

Organizational learning has received increasing attention as a potential solution for organizations facing change. Honda Motor company "..executives explain that the company's original ideas are born from what they term 'waigaya', a little-used expression meaning a free, random exchange of views by workers uninhibited by age or title, with the aim of achieving a certain objective" (Kaneko, p. 23).

Organizational learning is contrasted with individual learning because the results of organizational learning are available to the total organization. "Organizational learning is limited to public knowledge, but is socially defined as valid, relevant, and available to other members of the organization" (Duncan and Weiss, 1979, p. 88). Stata (1989) states that "organizational learning is serving as an umbrella to unify my approach to systems thinking, planning, quality improvement, organizational behavior, and information systems" (p. 64). In all writing about organizational learning, there are multiple definitions of and uses for the construct.

There is little research which describes how organizational learning occurs and how it manifests itself. Yet organizational learning has been described as a critical construct in differentiating the organizational behavior among firms with similar environments and markets. Further, organizational learning has been described as a potential unifying theory for the various theories of organizational

effectiveness. The promise of organizational learning is large and it appears that interest is increasing. "We still have only a primitive knowledge of how organizations learn and of how to overcome obstacles to organizational change" (Stata, 1989, p. 71-72).

Search for Existence of and Definitions of Organizational Learning

Organization theory has assumed that organizational learning exists and some research has focused on how the learning process occurs (Argyris and Schon, 1978; Jelinek, 1979; Eliot, 1980). The theorists have identified innovation or adaptation, for example, as manifestations of organizational learning. Others have attempted to describe the various organizational forms of organizational learning (Shrivastava, 1983).

Defining organizational learning and measuring its existence has been a major stumbling block. How can one determine the existence of something if there has been not generally accepted definition of what it is? The unifying concept and supporting rationale to study organizational learning is that successful organizational learning is perceived as the means for organizations to better cope (Hedberg, 1981; Fiol and Lyles, 1985; Stata, 1985; Dixon, 1992), but how is "coping" measured? Some believe that

adaptation is the result of learning (March, 1976) while others believe that learning or experience curves prove organizational learning (Boston Consulting Group, 1972; Baloff, 1966; Abernathy and Wayne, 1974; Andress, 1954; Day and Montgomery, 1983; Hirschmann, 1964; Rapping, 1965). Or perhaps, organizational success is the indicator.

Fiol and Lyles propose that, "organizational learning means the process of improving actions through better knowledge and understanding," (Fiol and Lyles, 1985). This latter definition is an attempt to stimulate further research. Daft and Weick (1984) assert that "Organizational learning is defined as the process by which knowledge about action outcome relationships between the organization the environment is developed," (p. 286). This definition, therefore, infers that action correlates to learning and useful payoffs. Jelinek (1979) states that organizational learning can be latent which makes research on this construct difficult since there may be no immediate measurable change.

Dery states that, "learning consists of the acquisition of knowledge" (Dery, 1986, p. 16). He then goes on to show that there is little understanding of "organizational knowledge" or organizational epistemology. Dery proposes organizational learning as a tool to better understand organizational use, or non-use, of knowledge. Ratliff (1981) follows the concept of shared knowledge with his definition of organizational learning as the conscious and

deliberate extension of a consensually shared knowledge base by members of the dominant coalition. Hedberg (1981) states that "organizational learning includes both the processes by which organizations adjust themselves defensively to reality and the processes by which knowledge is used offensively to improve the fits between organizations and their environments" (p. 3).

Jelinek (1979) states that "..organizational learning will be a communication phenomenon, a means of administering the interface between the individual and the organization," (p. 162). She asserts that for learning to be truly organizational, the learning or information must be accessible to all within the organization and its transmission is evidence of organizational learning. Argyris and Schon (1978) write that individual learning becomes organizational learning only when it becomes embedded in organizational memory. Organizational memory is data about the organization's past that is located in individuals, files, records, and other instruments.

Based on the multiple definitions listed, there is no consensus on defining organizational learning. It appears that most agree on the components of knowledge and some form of action, either actual or latent, based on the organization's understanding of the knowledge. It is unclear whether the learning is implicit or explicit.

Senge (1990) asserts that if there is organizational learning, then an organization designed around that process

is a learning organization. "A learning organization is a place where people are continually discovering how they create their reality. And how they can change it" (Senge, 1990, p. 13). Garvin (1993) defines a learning organization as "an organization skilled at creating, acquiring, and transferring knowledge and at modifying its behavior to reflect new knowledge and insights" (p. 80).

Review of Organizational Learning Research

Jelinek (1979) describes Texas Instruments (TI) as an innovative firm which has institutionalized its learning process through the Objectives, Strategies and Tactics (OST) process. The intent of the OST process was to provide a management system for managing innovation in a complex, high technology industrial organization. The OST process provided the opportunity for a shared frame of reference which Jelinek states is the necessary link from individual learning to organizational learning. OST provides the shared frame of reference for TI's organizational learning and trains junior management on overall corporate goals and innovation requirements while providing a focus context for senior management. Jelinek states that the administrative system of OST is the mechanism for organizational learning. Although the focus is on administrative systems, Jelinek's work showed how the planning process also was an organizational learning process. Jelinek (1979) states that

"..organizational learning will be a communication phenomenon, a means of administering the interface between the individual and the organization" (p. 162). She asserts that for learning to be truly organizational, the learning or information must be accessible to all within the organization and its transmission is evidence of organizational learning.

Meyer's (1983) research on Xerox stated that the process of innovation renewal was found to be one of an organization's learning how to increase innovative activity. This organizational learning occurs around changes in seven identified areas: strategy, structure, culture, marketing, R&D, manufacturing, and new product teams.

Ratliff (1981) conducted a field study of a small insurance company to test a model of organizational learning. He defined organizational learning as, "the conscious and deliberate development of organizational knowledge, which may be a formal or informal process, by the dominant coalition" (p. 5). No other research has used this model and the concept of dominant coalition appears to have little support. Also, Ratliff limits organizational learning to acquisition of knowledge only and does not link use of the knowledge to effective organizational action.

McClellan (1983) developed a general model of collective learning from his research. McClellan developed his general model by determining the commonalities of collective learning in the works of Karl Deutsch (a

cybernetic model of governmental learning); March and Olsen (organizational learning under ambiguity); Argyris and Schon (behavioral worlds and change in organizational theory of action); and Jurgen Habermas (societal learning as homologous to cognitive development). McClellan posits that an acceptable collective learning model should include (a) that all social systems exist in environing realities, (b) that all social systems are composed of learners, (c) that all social systems have collective lesson sets, (d) that all social systems have learning fields, and (e) that all social systems have modes of co-learning.

Application of Organizational Learning

The purpose of this section is to highlight the application of various organizational learning procedures to increase organizational capability, using Xerox's competitive benchmarking strategy as an example. Xerox developed the competitive benchmarking process as a means of measuring success in the marketplace (Jacobson and Hillkirk, 1986). Following the successful Japanese incursions into the copier market, Xerox was forced to restructure and change its way of doing business. Competitive benchmarking is one result of the changes. This process analyzes competing products within a given market segment to determine the best features of all the products. Xerox then

rates its products within that market segment against this composite product picture. The intent is to show what is technically feasible and to communicate within Xerox how tough the competition is. Learning from competitors is one of the sources for organizational learning.

The Xerox benchmarking process does not apply only to competitors. The company studied L. L. Bean, a major mail order distributor in New England noted for its customer service, to provide insights on warehousing. "Xerox has used benchmarking as a tool in its drive to lower manufacturing costs, reduce employment levels, accelerate product development, and pay more attention to what the customer wants. It also uses benchmarking to spot other business opportunities," (*Jacobson and Hillkirk*, 1986, p. 231). Xerox has made a conscientious effort to learn new and better ways of doing business, not only through external searching but also through active employee involvement.

Definition of Terms

This study defines organizational learning as the creation, acquisition, and transfer of knowledge within an organizational context and the modification of behavior to reflect new knowledge and insights (Garvin, 1993). This definition really means systemic change which results in both improved internal performance and external contributions. This definition links knowledge and action

to provide for organizational improvement, the true aim of organizational learning.

This study defines doctrine as "the fundamental principles by which military forces guide their actions in support of national objectives. It is authoritative but requires judgment in application" (Joint Chiefs of Staff Publication 1-01, 1988, p. viii).

Assumptions

An assumption of this study is that written Army doctrine is a purposeful articulation of the Army's learning about the waging of ground warfare. This study assumes that organizational learning occurs according to the Dixon (1992) model of information acquisition, information interpretation and distribution, making meaning of information, organizational memory, and information retrieval. This model is discussed in Chapter II and is covered by research questions two through seven.

This study further assumes that effective organizational behavior occurs according to the Kaufman (1992) Organizational Elements Model (OEM) of inputs and processes which are linked to produce, in sequence, products, outputs, and outcomes. This model, discussed in Chapters II and IV, is covered by research question one.

Research Methods

The research focuses on the development and promulgation of AirLand Battle doctrine in the United States Army as stated in Field Manual 100-5, *Operations*, 1982 version. This study looks at the dynamics of organizational learning which lead to the adoption of the new manual six years after the Army's adoption of Active Defense doctrine in the 1976 edition of the manual. Further, the study discusses how the new doctrine was transmitted to the Army in the years following publication.

Research Procedures

This was a study of organizational learning using historical data. The *Military Review*, published by the Army's Command and General Staff College, provided a unique window to thinking about Army doctrine. I tracked and analyzed articles in this journal with the premise that these writings indicate the directions of conceptual thinking within the Army. The Army has a tradition of using military journals as forums for airing and promulgating current thinking, as well as a forum for promoting change. However, it must be remembered these journals can be used to articulate approved positions.

The Office of the Command Historian, US Army Training and Doctrine Command, was a rich source of original material

on doctrinal change. Further, the historians in the US Army Training and Doctrine Command History office provided additional insights into historical research methodology in terms of historical source validity and provided an unbiased review of historical methodology in terms of thoroughness and validity of data.

The research focused on the questions articulated earlier and the historical data was checked to determine if a potential framework of organizational learning emerges. The intent was to determine if organizational learning could be discerned and to determine its dynamics. This research process attempted to show organizational learning in a *post hoc* fashion since the Army did not formally articulate that it was a learning organization to the extent discussed in this study.

Research Limitations

There was the bias inherent with a single researcher. I believe that my awareness of this limitation and the effectiveness of the review committee helped limit this bias. Further, the historians in the Office of the Command Historian, Training and Doctrine Command, provided ongoing guidance as the drafts were reviewed which also helped eliminate bias.

Although not necessarily a limitation, but perhaps a strength, I believe it is required that I identify my activities in the Army during the period under study. I was in the field Army from 1976 until July 1982. I then attended the Command and General Staff College, Fort Leavenworth, Kansas, from July 1982 until June 1983. My class was the first to receive instruction under the approved AirLand Battle doctrine as stated in FM 100-5, *Operations*, 1982 version. After graduation, I was assigned to another agency at Fort Leavenworth and worked on various training initiatives to institutionalize the new doctrine. I worked at Fort Leavenworth, Kansas until 1987. Therefore, I was in a unique position to observe and participate in the Army's efforts to embed AirLand Battle doctrine in all aspects of Army activity. I supported AirLand Battle doctrine, believed in it, and was a spokesman for it.

Delimitations

The study is limited to the period from 1976 to 1986. This comprises the period leading to the adoption of the AirLand Battle doctrine in 1982, following the publication of the 1976 Active Defense doctrine, and the first years of its implementation (1982-1986). The period was chosen because it marks a period of intense debate within the Army about the waging of ground warfare and is identified with

doctrine as a central element; thus it is a prime candidate for a study of organizational learning.

Organization of the Dissertation

Chapter two of this dissertation is a review of the literature on organizational learning and on military doctrine. This chapter includes a review of the literature pertinent to the guiding research questions. Chapter three discusses the research procedures. Chapter four provides the results of the research and includes a chronology of events and an articulation of historical data pertinent to the guiding research questions. Chapter five discusses the conclusions from this study and recommendations for future research.

CHAPTER II

Review of the Literature

Overview

The purpose of this study is to examine the organizational learning dynamics and consequences of doctrinal change in the United States Army from 1976 to 1986. The problem under study is determining the organizational learning dynamics for an organization to learn a new conceptual model to accomplish its mission. The purpose of this chapter is to review the relevant literature on organizational learning and on military doctrine. This chapter will include an overview of the reviews of the literature, a review of the literature of organizational learning in governmental organizations, a review of the literature pertinent to the study questions, and a review of literature on military doctrine.

The literature search included multiple searches of various services such as Dialog Information Services, Manpower and Training Research Information System of the Defense Technical Information Center, and ERIC. Further, because The George Washington University Department of Human Resource Development started work in the field of

organizational learning, there were several working bibliographies of organizational learning literature and I helped develop these bibliographies and shared documents.

Reviews of the Literature

The purpose of this section is to provide an overview of organizational learning literature through recent reviews of the literature. There are six reviews of the literature used here: Hedberg (1981), Shrivastava (1983), Fiol and Lyles (1985), Levitt and March (1988), Huber (1991), and Dixon (1992).

Hedberg (1981), writing from an organizational development perspective, discusses how organizations learn, unlearn, and relearn with the premise that organizations must do these activities to maintain viability. He states that "organizational learning includes both the processes by which organizations adjust themselves defensively to reality and the processes by which knowledge is used offensively to improve the fits between organizations and their environments" (Hedberg, 1981, p. 3). This definition supports the premise that organizations can and do adapt to their environment, but work to fit the environment to the organization. Therefore, learning is more than a reactive form of adaptation.

Hedberg's review of learning research goes from the static absorption of knowledge to the active learner as

actor/experimenter. With the active learning form, "learning thus encompasses the processes whereby learners iteratively map their environments and use their maps to alter their environments (Hedberg, 1981, p. 5)." Hedberg states that this requires a balance of change and stability. Sufficient change is required to maintain learning, otherwise routine behaviors would suffice, and sufficient stability is required to enable learners to experiment and build maps. However, Hedberg does not define what sufficient change or stability is. Stability becomes a management function in a period of accelerating change.

He raises the issue of whether organizations truly learn or whether what is called organizational learning is, in reality, simply individual learning. His answer is that "it is individuals who act and who learn from acting; organizations are the stages where acting takes place. Experiences from acting are stored in individuals' minds, and these experiences modify organizations' future behaviors" (Hedberg, 1981, p. 3). Yet, organizations have memories and beliefs which influence individual learning. "Knowledge of how organizations influence their member's learning and how they store and transmit the products of learning is important to anyone who manages, designs, or studies organizations" (Hedberg, 1981, p. 6). Hedberg further asserts that research is required to determine the interplay between individual and organizational learning.

Organizations, Hedberg (1983) continues, are open systems within an environment. Learning occurs based on feedback from stimulus-response between the organization and its environment. There is a range of learning and responses from simple to complex. This learning can range from a simple change in an organizational response to better fit a change in the environment, to a complete organizational restructuring of beliefs and goals. This means that there are multiple levels of learning based on complexity. These levels of learning link to Argyris and Schon's (1978) single-loop learning and double-loop learning. (Single loop-learning is learning based on adjustments to accomplish a set goal, while double-loop learning is learning that occurs from adjusting both organizational actions and organizational goals., i.e. the original goal is no longer valid.)

Hedberg (1981) then asks how an organization selects and organizes stimuli for response since "little has been written about how organizations develop their perceptual filters and define situations" (p. 8). Yet this area is vital to learning because filters are critical to an organization's construction of reality. Perceptual filters make observations meaningful, but these filters also bias beliefs and actions. "The real world provides the raw material of stimuli to react to, but the only meaningful environment is the one that is born when stimuli are processed through perceptual filters" (p.8).

Organizations learn regardless of whether the learning cycle is complete or if it is incomplete. A complete learning cycle occurs when there is an uninterrupted chain from stimulus through response and the associated feedback. Incomplete learning cycles, the most common, occur when there are interruptions in the cycle. However, even though the cycle is incomplete and the learning is based on scant information, the learning is still present and is considered valid by the organization.

> "But learning cycles are often interrupted or disturbed. Organizations have difficulties in tracing which actions caused environmental responses. Individuals in organizations sometimes form their beliefs on misinterpretations of cause-effect relationships or even through influences from outside sources. This gives room for theories of action--myths--with low or no validity to the concerned organization. Schools of thought substitute for actors' own firsthand experiences. Myths are created on spotty evidences" (Hedberg, 1981, p. 11).

Theories of action and myths are schema which guide organizational action. The consequences to organizational effectiveness are affected greatly by the validity of the schema. These schema are determined through learning processes which make them organizationally acceptable.

Hedberg (1981) discusses how "environments affect learning." He states that there is a direct relationship between environmental change and the organizational requirement to learn. But, how will organizations handle the increasing rate of change and information overload? Although many organizations have learned to cope with

uncertainty and information overload, Hedberg does not explain how some organizations accomplish this. Thus organizational learning capability is a function of both the environment and coping capacity. Further, there is the impact of the organization's inner environment.

> Studies have shown that decisions and learning improved after the currency, accuracy, and scope of information were improved...Thus, there are many ways in which organizations can influence their own learning. They can select and enact their outer environments, and they can redesign their inner environments. Organizations learn when they interact with their environments, but their environments are largely artifacts of the organizations' mental maps (Hedberg, 1981, p. 15).

Hedberg asserts that problems generally trigger organizational learning. However, if "problems were the only triggers of learning, problem-ridden organizations would be the best innovators" (p. 17). Research does not support this. "Neither scarcity and severe problems nor affluence and benevolence provide a good climate for learning" (p. 17). People can trigger learning and, equally important, people can cause organizational memory loss when they leave the organization. Major organizational learning has occurred under new leadership which required the letting go of previous learning.

Hedberg (1981) states that "unlearning is a process through which learners discard knowledge. Unlearning makes way for new responses and mental maps (p. 18)." Unlearning occurs through both a complete and incomplete cycle. During incomplete cycles, again the most common, organizational

battles for dominance include the right to determine new organizational maps. "Organizational unlearning is typically problem-triggered" (Hedberg, 1981, p. 19).

Organizational improvement is possible through application of knowledge about how organizations learn, unlearn, and relearn. However, first, a theory of these phenomena must be developed. Second, organizational experimentation should be increased and supported. Next, organizational awareness of the environment should be increased, including reducing perceptual filter adjustment. This means no more "sugarcoated" reports. Further, organizational redesign can support learning, as well as managerial changes to support learners. Hedberg (1981) closes with the premise that learning, unlearning, and relearning are all organizational competencies, and that lacking any one of the three dooms the organization.

Shrivastava (1983) "attempts to define a set of concepts related to organizational learning in an attempt to develop a typology of organizational learning systems (p.7)." He states that, although there is research into individual learning, there is little work on organizational learning. However, Shrivastava asserts that what has been done in organizational learning, can be generalized into four perspectives (a) organizational learning as adaptation, (b) organizational learning as assumption sharing, (c) organizational learning as developing knowledge of

action-outcome relationships, and (d) organizational learning as institutionalized experience (p. 9).

The first perspective of organizational learning as adaptation implies that adaptation is a result of organizational learning. This is similar to Hedberg's (1981) stimulus-response learning model. Organizational environmental changes create the requirement for organizations to attend to these changes and modify or discard goals and behaviors to maintain organizational effectiveness. The most effective organizations attempt to determine future environmental changes and make the required organizational modifications to adapt to the future.

Shrivastava notes several studies on ineffective adaptive learning characteristics of governmental organizations that show sub-optimal, irrational, and wasteful behaviors. He summarizes that this ineffective learning is a, "progression of small adjustments...moderated by intra-organizational conflicts and bureaucratic procedures. Organizational learning is prompted by environmental complexities, uncertainties about the future, and inadequate incentives for individuals to act as rationally as possible" (Shrivastava, 1983, p. 11). However, other studies show that effective organizations learn to predict environmental changes and adapt to take advantage.

Shrivastava's second perspective of organizational learning as sharing of assumptions is primarily based on

Argyris and Schon's (1978) concepts of "organizational theories-in-use or theories of action" which "result from sharing of assumptions and cognitive maps among organizational members" (p. 11). The amalgam of these individual theories becomes the organizational cognitive map, and organizational learning occurs when this map is adjusted.

Shrivastava's third perspective of organizational learning is developing the knowledge of action-outcome relationships. He leans heavily on work by Duncan and Weiss (1979) to support this perspective. Organizations are seen as systems of actions producing outputs from inputs. There is no mention of the efficacy and value of these outputs for the society and environment in which the organization puts them. Organizational learning as the development of a knowledge base develops from the premise that "organizational effectiveness is determined by the quality of the knowledge base available to the organization for making the crucial strategic choices" (Shrivastava, 1983, p. 13). In this context, knowledge is developed about the effects of past actions and the effectiveness of past decisions, which is related directly to the effectiveness of the knowledge base. Shrivastava then defines organizational learning using Duncan and Weiss' (1979) definition as the process within the organization by which knowledge about effects of action relationships and the effects on these relationships is developed. However, this knowledge base

creation can be hampered by organizational ideologies, rigid structures, and other threats to learning.

Shrivastava's fourth perspective of organizational learning as institutional experience deals with learning curves and other activities where the organization gains facility with procedures through repetition. The expertise is readily available to do the same task again, but in a faster way. This learning varies within an organization by organizational hierarchy.

Based on these perspectives, Shrivastava asserts that there are organizational learning systems which are institutionalized by organizational learning. These systems are based on organizational practices (theories in use), are known by organizational members, cover broad aspects of organizational activities, and provide and interpret organizational knowledge. He asserts that a typology of learning systems can be placed within two dimensions--the individual-organizational dimension and an evolutionary-design dimension. He then identifies six learning systems which can be placed within the context of the dimensions mentioned above: (a) one man institution, (b) mythological learning systems, (c) information seeking culture, (d) participative learning systems, (e) formal management system, and (f) bureaucratic learning system.

Fiol and Lyles (1985), writing from a strategic management perspective, state that "although there exists widespread acceptance of the notion of organizational

learning and its importance to strategic performance, no theory or model of organizational learning is widely accepted" (p. 803). The value of organizational learning is the "..assumption that learning will improve future performance.." (p. 803). They define organizational learning as "..the process of improving actions through better knowledge and understanding" (p. 803). Fiol and Lyles' definition implies a causal relationship between knowledge acquired and organizational action. However, they assert that change, per se, is not proof of organizational learning. Therefore, perhaps a new measurement is required to determine if learning occurred and its effectiveness. They do no suggest any criteria or measurement, however.

In their summarization of the literature, they reiterate the elements of organizational alignment with an organization's external environment and the distinctions between individual and organizational learning. Further, they conclude that to facilitate organizational learning, individual organizations should have a supportive culture, flexible or responsive strategy, a structure allowing both innovation and development of new insights, plus an environment conducive to learning. There is no mention of any specific reward system or structure.

Fiol and Lyles (1985) detail the difficulty in the literature with the interchange of the terms "change, learning, and adaptation." They suggest there are two contents of learning. One is "cognition development" which

means the organization's adjustments based on organizational interpretations of events or shared understanding and conceptual schemes. The other is "behavior development" to mean actions taken supported by these interpretations. Further, they support the idea of levels of learning, and state that there is low-level and high-level cognitive development as articulated by Hedberg (1981).

Because of the difficulty in determining whether organizational actions are caused by organizational learning or just unreflective adjustments, Fiol and Lyles (1985) assert that longitudinal studies of organizations and their adjustment decisions are required. They offer definitions of learning and adjustment as guides in these studies:

> Learning: The development of insights, knowledge, and associations between past actions, the effectiveness of those actions, and future actions.
>
> Adaptation: The ability to make incremental adjustments as a result of environmental changes, goal structure changes, or other changes (Fiol and Lyles, 1985, p. 811).

They assert that, upon adopting these terms, the research challenge becomes one of measurement to determine whether learning or adaptation occurs. However, they do not provide a specific measure and provide no examples of organizations that adapt versus those that learn. There must be deeper investigations into organizations that go beyond the recognition of change. This learning is vital in

terms of strategic management because, ultimately, it may mean corporate survival.

Levitt and March (1988), writing from a sociological perspective, state that organizational behavior is based on routines, that organizational actions are history dependent, and that organizations are oriented to targets. Routines are built by encoding lessons from organizational experience or history and the routines are accessible to organizational members, but not necessarily the context and history of the experience. They define routines as procedures, rules, beliefs, assumptions, culture, and other enduring organizational elements that outlast and are independent of organizational members who execute them. These routines can be changed through learning and "these changes depend on interpretations of history, particularly on the evaluation of outcomes in terms of targets" (Levitt and March, 1988, p. 320).

Routines can be changed by learning from direct experience through either experimentation or organizational search (a purposeful look for information). The learning from experimentation is encoded into a routine based on whether or not the organization met its target. If successful, encode, or discard if a failure. Production learning curves are good examples of this type learning (Rapping, 1965).

A competency trap occurs when successful past behavior with a given routine stops an organization from learning a

better method. Organizations may adapt quickly to a new technology and become adept at its earliest practices; however, as the technology matures and improves, individuals and organizations may not move to the better routines because of their competence and investment in the earlier technology. Thus, organizations that adapt quickly may find themselves at a disadvantage compared to later adapters who use a newer technology and who develop superior routines which provide superior products with potentially higher profit margins.

Organizations interpret their experiences. How they do this, and how it is encoded, is vital to learning. Generally, this process is limited to evaluating a few pieces of data that individuals then attempt to describe as "good" or "bad". Because individuals are not good intuitive statisticians, they tend to make large errors in their interpretations and they act on these interpretations. Thus, there can be great bias in interpretations and subsequent actions.

Organizations do attempt to develop "collective understandings of history" (Levitt and March, 1988, p. 324). This development is based on paradigms and frames that exist within the organization. The understanding of history may depend more on the frames used than the actual history. Within some organizations, there are multiple frames and supporters of the various frames may interpret the same history very differently. Thus the frame may impact what is

learned more than the history itself. Learning may occur both from changing frames and from the interpretation of history.

The difficulty of interpreting history is exacerbated by usefully defining success. If organizations interpret the value of an experience based on its contribution to success or failure, then how one defines success is crucial. Individuals tend to attribute success based on their advocacy prior to the event while those who did not subscribe to the process tend to find failure. Further, organizational targets can be adjusted or interpreted to fit within the bounds of success.

The final element in interpreting experience is superstitious learning. This concept originally was discovered by B. F. Skinner (1948) in his "superstition and the pigeons" experiment. This false learning occurs when "the subjective experience of learning is compelling, but the connections between actions and outcomes (sic) are misspecified" (Levitt and March, 1988, p. 325). For example, during periods of prosperity when the organization is very successful, organizational routines are reinforced even though they may not be causal factors in the success. The reinforcement of these routines is very strong, but the ensuing learning may be wrong.

Besides learning from direct experience, organizations learn from the experiences of others. Learning from others can be disseminated by direct contact with other

organizations, consultants, educational institutions, trade journals, governmental regulations, unions, as well as hiring people from other organizations. Also, there is learning through espionage since some information is guarded. The dynamics of learning from others is directly related to organizational gain. If following societally accepted practices is required for legitimation, then organizations will imitate these practices. Organizational leaders will attempt to emulate practices which give competitors an advantage; however, the competitor will attempt to keep these practices secret since they will lose a competitive advantage. Also, the competitor can continuously improve his processes to sustain competitive advantage which makes emulation difficult.

Organizational memory is the repository for organizational learning. This memory is larger than the written documents that record organizational activity because the cost of recording everything is too high (Levitt and March, 1988). However, learning derived from experience is maintained in both written and unwritten routines. There is not one standard organizational memory since various organizational elements may maintain their own memory about certain events.

Organizational members learn routines through both formal and informal learning. But this transmission of routines is critical if the learning is to be preserved. Sometimes routines are lost. For example, when an influx of

new members overtakes the capacity of the organization to transmit the routines there is no medium for transmission of the informal routines. Learning may be lost because it is no longer is in the organization's active memory.

Organizational experience is retrieved from memory through various means. The ease of retrieval is directly related to how often the knowledge is used, how recently it was used, and its proximity. Proximity is based on whether or not the routine is within the functional scope of the organizational entity attempting to use the routine. For example, marketing information may not be available to the production department. A routine outside the normal scope is more difficult to retrieve from since it is has little proximity and its existence may be unknown.

Levitt and March (1988) posit that the ecologies of learning (organizations learning in an environment of other learners) create two challenges to organizations. First, because the external environment (other learning organizations) is changing and adapting, organizational routines may have different results at different times. Second, systematic comprehension and modeling of learning processes is difficult within an ecology of learners because of constant change in both internal and external environments. They describe the latter challenge within a context of learning among a group of competitors. The performance of competitors based on their learning and implementation of learning can only be articulated by

referencing the context of the competitive situation. In this competitive context, "there is a tendency for organizations to specialize and for faster learners to specialize in inferior technologies" (p. 332).

If learning becomes an element of organizational competence, what causes some organizations to learn and others not to do so? If an organization is strong enough to have sufficient control over its environment or believes that it is strong enough, it may perceive no requirement to learn. Smaller competitors must learn to adapt to the behavior of the larger competitor. Therefore, smaller competitors may be more adept at learning while the more powerful competitor can ignore minimal competition and exhibit no motivation to learn. However, it is unclear at what point the environment changes sufficiently so that the large competitor's learning problem becomes a decided competitive disadvantage.

Levitt and March (1988) state that learning is a form of intelligence. If an organization learns well, then its intelligence, and thus its performance is enhanced. However, it is not easy to implement organizational learning as a form of intelligence because of the paucity, redundancy, and complexity of experience. Organizations can lessen the effects of these learning challenges. They can reduce paucity through sharing routines within the organization, but there is the potential for incomplete learning or learning without understanding the

context--superstitous learning. By slowing the rate of change, organizations can increase the depth of understanding about a given experience. Organizations can gain experience through modeling and simulation for those situations where there is a high consequence but infrequent implementation, such as an army fighting a war. Organizations can reduce the negative impact of redundancy of experience on learning by supporting organizational experimentation through various means. Organizations can reduce the complexity of learning by making single large changes that are more amenable to study and determine causal relationships. However, organizations should remember that early adopters may become adept at an inferior technology; the competency trap discussed in Fiol and Lyles (1985).

Levitt and March go on to state that "learning does not always lead to intelligent behavior. The same processes that yield exponential wisdom produce superstitious learning, competency traps, and erroneous inferences" (p. 335). This does not mean that organizations should ignore organizational learning. Other organizational processes have difficulties in implementation, but that does not infer they should be discarded.

> To be effective, however, the design of learning organizations must recognize the difficulties of the process and in particular the extent to which intelligence is often frustrated, and the extent to which the comprehension of history may involve slow rather than fast adaptation, imprecise rather than precise responses to experience, and abrupt rather than incremental changes (Levitt and March, 1988, p. 336).

Huber (1991), writing from an organizational science perspective, defines organizational learning with a very broad perspective. "An entity learns if, through its processing of information, the range of its potential behaviors is changed" (Huber, 1991, p. 89). He supports this perspective because the study of organizational learning is in its early stages and a narrow definition might stifle the potential knowledge to be gained. He further adds, "with respect to the existence of organizational learning, let us assume that an organization learns if any of its units acquires knowledge that it recognizes as potentially useful to the organization" (p. 89). Thus, Huber supports the concept that learning must occur within some organizational level, rather than among individuals, but not necessarily the entire organization and the learning does not have to have any effect on the organization

Huber (1991) develops four constructs and processes of organizational learning (a) knowledge acquisition, (b) information distribution, (c) information interpretation, and (d) organizational memory.

> Knowledge acquisition is the process by which knowledge is obtained. Information distribution is the process by which information from different sources is shared and thereby leads to new information or understanding. Information interpretation is the process by which distributed information is given one or more commonly understood interpretations. Organizational memory is the means by which knowledge is stored for future use (Huber, 1991, p. 90).

Huber (1991) articulates a series of subconstructs and subprocesses within his four major constructs. The first subconstruct under knowledge acquisition is "congenital learning" which represents the knowledge base that came with the organization's founding. The second subconstruct is experiential learning which has five further subconstructs (a) organizational experiments, (b) organizational self-appraisal, (c) experimenting organizations, (d) unintentional or unsystematic learning, and (e) experience-based learning curves. The third and fourth subconstructs of knowledge acquisition are vicarious learning, which means learning from other organizations, and grafting, which means learning through alliances and mergers. The final subconstruct is searching and noticing which includes scanning, focused search, and performance monitoring as its subconstructs and processes. Information distribution has no subconstructs; however, Huber (1991) does note that employee transfers are one means of non-routine information distribution. Information interpretation has four subconstructs and subprocesses (a) cognitive maps and framing (similar to Levitt and March (1987), (b) media richness which determines the extent of common meaning between sender and receiver, (c) information overload, and (d) unlearning. Organizational memory has storing and retrieving information and computer-based organizational memory as its subconstructs and subprocesses.

Many of these subconstructs and processes mentioned above have been discussed before in this chapter. However, Huber asserts weakness in the research of many of these processes because researchers fail to follow accepted systematic research procedures which build upon predecessor work. This failure may be because the limited efforts to date are in different disciplines and are out of the search domains for various researchers.

Overall, Huber (1991) concludes that there is much wider array of organizational learning than what is discussed in the literature. Further, "with few exceptions (e.g. experience-based learning curves and information distribution), there is little in the way of substantiated theory concerning organizational learning and there is considerable need (sic) and opportunity to fill in the many gaps" (Huber, 1991, p. 107). Last, he concludes that there is little effort on how to prepare organizations to be more effective learners.

Dixon (1992), writing from a human resource development perspective, reviews the literature and discusses what organizational learning means for human resource development practitioners. There is a growing requirement to address learning at the organizational level due to the rate of change and global competitiveness. However, most human resource development efforts have focused on individual learning. Organizational learning supposes a new competency for the human resource development field since learning is

within the human resource development professional's area. If an organization wants to become intentional in its organizational learning, then the human resource development practitioner is most likely to be called upon to facilitate the change.

Dixon (1992) develops a model with five elements, (a) information acquisition, (b) information distribution and interpretation, (c) making meaning which puts information into an organizational perspective and allows for information use, (d) organizational memory, and (e) retrieval of information. When using this model, she asserts that it is ongoing and interactive rather than sequential and independent. She further suggests areas in which human resource development practitioners can assist their organizations through increasing management and effectiveness of organizational learning.

The information acquisition element includes both internal and external processes. The first external process is borrowing, which includes conferences, consultants, and printed materials. The second external process is searching, which includes the subprocesses of reports, customers, and competitors. The last two external processes of information acquisition are grafting, which includes new members and acquisitions and mergers, plus collaborating, which includes joint ventures and consortiums. The internal processes of information acquisition are congenital, experiential, experimenting, continuous process improvement,

and critical reflection which includes the subprocesses of dialogue, action science, and questioning assumptions.

Dixon's (1992) second organizational learning model element is information distribution and interpretation. This element includes the processes for distributing and interpreting information. Distributing information includes the intentional processes of individual written communication, training, internal conferences, briefings, and internal publications. The unintentional processes of distributing information include job rotation, stories and myths, task forces, and informal networks. The interpreting information process includes dialogue, critical reflection, process checks, taking action, and unlearning. This interpreting information process also is included as a process within the making meaning element. Dixon (1992) asserts that this interpretation process is a new area with great promise for human resource development practitioners. The other process within the making meaning element is analyzing information. This process includes rational analysis, problem solving processes, extrapolating from past events, strategy formulation, and decision support tools.

Her fourth organizational learning model element is organizational memory which includes both internal and external processes. The internal process is further subdivided into intentional memory and tacit memory. The intentional memory includes expert systems, record and reports, policies, core competence, and transformations

which include the processes of the organization such as budgeting. for example. The tacit processes of internal organizational memory are culture, structure, ecology, and theories of action. The making meaning process of critical reflection is important in revealing tacit memory to enable the organization to determine its validity and to learn from it. It is important to note that organizational memory can have both positive and negative implications for the organization. Memory can be negative if organizational members act on memory without understanding its context and, without thinking, apply old solutions to new problems. Memory can be positive because it can reduce the requirement to learn lessons over again.

Retrieval of information is the final element in Dixon's (1992) model of organizational learning. This element has two major processes, controlled and automatic retrieval. The controlled process includes individuals and groups of individuals. The automatic processes are culture, ecology, structures, and individual tacit knowledge.

Organizational Learning in Governmental Agencies

There are few studies of organizational learning in governments and governmental agencies. McClellan (1983) describes the first work on governmental organizational learning, Karl Deutsch's 1963 cybernetic model of a political system, as limited since it primarily concerns

decision making. Since all collective learning is not for decision making purposes, the model provides few guides to collective learning for other purposes. However, the model has value in its discussion of learning capacity, the ability to recombine resources to meet environmental changes. This links learning to behavior and shows organizational potential to succeed in changing circumstances.

Shrivastava's (1983) review of organizational learning by governmental agencies also focuses on decision making and shows irrational and wasteful patterns of behavior because decision makers do not know better ways. Learning is incremental, moderated by intra-organizational conflicts and bureaucratic procedures, with poor incentives for rationality (Shrivastava, 1983). Learning is triggered by environmental complexities and uncertainty about the future.

A study of ten Polish firms operating under a planned economy provide a unique picture of organizational learning of firms under governmental control (Swiderski and Swiderska, 1986). The study results show that the organizations tended to stay very close to set targets, since variation was punished either by withholding of rewards or setting of high future quotas. Thus, organizational learning took the form of identifying Central Authority behaviors, not market behaviors, and developing coping measures, even if the measures injured the firm. This study seems to identify some potential pitfalls of

sub-optimal governmental learning. It also may articulate a central reason that the planned economies of the Soviet Union and eastern European countries failed in the late 1980s.

The World Health Organization's (WHO) successful smallpox eradication program provided a study of a political entity implementing effective organizational learning (Hopkins, 1988). The societal outcome or purpose was to create a world free from smallpox. The eradication teams learned that the original strategy of mass inoculations was not feasible, so they substituted an "isolate and contain" strategy. They adapted new technology and intervention practices to fit their various working environments, especially local cultures. A key learning point was the requirement for accurate problem definition, not simply application of existing technology (i.e. what is the problem, not what is the solution). Another point was to build a flexible organization and follow managerial practices which allowed it to adapt to new knowledge, technology, and local conditions. The organization developed was to have incentives that promoted performance and accurate reporting. The study also articulated the requirement to develop unambiguous and direct measures of task achievement, such as smallpox cases, as the heart of program evaluation, not secondary measures such as number of vaccinations given.

At this point, I relate the literature to the guiding research questions. The research question heads the section with the literature following.

Research Question 1: How Do Organizations Link Inputs and Processes to Products, Outputs, and Outcomes?

The basis of this question is to determine if the learning is directed to some organizational purpose. The question uses the Kaufman (1992) Organizational Elements Model of inputs linking through processes to create, a forward flow of products, outputs, and outcomes. The process can be non-linear with some organizational products as inputs to other organizational units. The outcomes relate to the costs or benefits of the organizational outputs as they relate to society at large; what Kaufman calls the mega-level of planning. A sample of the model using a hospital follows:

Organizational Elements Model				
Inputs	**Processes**	**Products**	**Outputs**	**Outcomes**
Nurses Budget Physicians Facilities	Drug Therapy Surgical operations	Removal of growths	Discharge of patient	Return to health Self-sufficiency

Table II - 1

Senge's (1990) work discusses how organizations become intentional about organizational learning to increase their effectiveness and cites one example of a successful firm. However, since organizational learning is a relatively recent area of study, there are few instances of organizations stating their intent to become learning organizations. Thus, it is difficult to find much in the literature about the overall effectiveness of organizational learning or learning organizations.

Research Question 2: What Motivates an Organization to Learn?

Toynbee (1946), in his epic work on the rise and fall of civilizations, has argued that civilizations are created because of the challenge to respond to the stimulus of adverse environments (Toynbee, 1946). There is the stimulus of a hostile geographical environment, the stimulus of new territory that has never been cultivated, the stimulus of a major defeat, the stimulus of "pressures" from neighboring forces, and the stimulus of outright servitude or second class citizenship. Although not explicitly stated as an organizational learning theory, Toynbee argues that

> All growth originates with creative individuals or small minorities of individuals, and their task is twofold: first the achievement of their inspiration or discovery, whatever it may be, and secondly the conversion of the society to which they belong to this new way of life. This conversion could, theoretically, come about in one of two ways: either by the mass

> undergoing the actual experience which has transformed the creative individuals, or by their imitation of its externals--in other words, by mimesis. In practice the latter is the only alternative open in the case of all but a small minority of mankind. Mimesis is a 'short cut', but it is a route by which the rank and file, en masse, can follow the leaders. (Toynbee, 1946, p. 576-77)

Civilizations which did not learn, and failed to respond to their environment, succumbed. Therefore, a successful learning response was vital for survival.

Hedberg (1981) states that, for organizations, "learning is generally triggered by problems," (p. 16). This fits with Toynbee's notion of adversity as a motivation to learn. However, Hedberg goes on to list three "triggers" to learning: problems, opportunities, and people.

Problems as triggers to learning are self-evident. If profits are decreasing or the competition has a better product, the organization generally is forced to look for solutions. This searching is a learning process, but it does not presuppose a successful response. This type learning generally conforms to Argyris and Schon's model of single-loop learning where the firm changes only to support the current organizational goals and measures of success (Argyris and Schon, 1978).

Opportunities can provide a trigger for learning but opportunity does not automatically trigger learning. A very successful firm often rests on its current success and does not search for new markets, processes, or other means to ensure future success. Success often blinds the organization to its opportunities. The firm is unwilling to

change its operational contexts to allow new knowledge into decision making. In this case, the firm fails to follow Argyris and Schon's double-loop model of learning where the firm learns and modifies its original goals and measures of success (Argyris and Schon, 1978).

People can alert the firm for the requirement to change, but like opportunities as triggers, organizations do not always listen. A change in leadership often is the primary means for organizational learning because the new leadership redefines organizational goals and measures of success. When new leadership sets new organizational contexts, the firm can follow the double-loop learning model. This does not mean that employees use only single-loop learning however.

Hedberg's discussion about triggers to learning implies a motivation to learn; however, it appears that the triggers may be latent motivators. What differentiates one firm's willingness to explore and learn from another firm's complacency? The answer to these questions may be determined only if research can truly define a "learning organization."

Research Question 3: Who Learned the Requirement to Learn?

> Just as individuals are the agents of organizational action, so they are the agents for organizational learning. Organizational learning occurs when individuals, acting from their images and maps, detect a match or mismatch of outcomes to expectations which confirms or disconfirms

> organizational theory-in-use. In the case of disconfirmation, individuals move from error detection to error correction. Error correction takes the form of inquiry. The learning agents must discover the sources of error--that is, they must attribute error to strategies and assumptions in existing theory-in-use. They must invent new strategies, based on new assumptions, in order to correct error. They must produce those strategies. And they must evaluate and generalize the results of that new action. 'Error correction' is shorthand for a complex learning cycle. But in order for organizational learning to occur, learning agents' discoveries, inventions, and evaluations must be embedded in organizational memory. They must be encoded in the individual images and the shared maps of organizational theory-in-use from which individual members will subsequently act. If this encoding does not occur, individuals will have learned but the organization will not (Argyris and Schon, 1978, p. 19).

The above discussion shows one model of the role of individuals in learning about the requirement to learn. Hedberg (1981) also discusses people, without naming specific organizational actors or roles, as learning about the requirement to learn and change. Daft and Weick (1984) assume that strategic level managers in organizations interpret information for the organization. Thus, one could surmise that this level manager is the organizational learning agent. Overall, the literature is vague about the aspect of who learns the requirement to learn.

Research Question 4: How Does an Organization Learn from the Environment?

This question relates to the information acquisition element in both the Huber (1991) and Dixon (1992) models. Organizations can learn from both the internal and external environment.

Internally, organizations have the information that was current at the start, or congenital information (Huber, 1991). This information determines what the organization considers important and determines to which information the organization will attend. Organizations enlarge their information base though experiential learning, such as production learning curves (Rapping, 1965), reflection on organizational action (Argyris and Schon, 1978), simulations (deGeus, 1988), and organizational experiments (Hedberg, 1981).

Organizations can acquire information through alliances and mergers (Pucik, 1988), by searching (deGeus, 1988; Hedberg, 1981), by attending conferences, and other fora, plus hiring consultants (deGeus, 1988; Hedberg, 1981), and from espionage (Levitt and March, (1987). Organizations can acquire information either through a focused search or through haphazard processes (Cangelosi and Dill, 1965).

Research Question 5: What Are Organizational Interpretation Systems?

Argyris and Schon state a theory of organizational learning which includes a model of single-loop learning and a model of double-loop learning (Argyris and Schon, 1978). The model offers the opportunity for the organization to interpret information in a manner to determine fit with existing goals or the opportunity to interpret information in a manner that requires changing existing goals. Organizational mental models (Senge, 1990) can be reinterpreted though the Argyris and Schon (1978) double-loop process as supported by action science (Argyris, Putnam, and Smith, 1987).

Daft and Weick (1984) have a three step model of organizational scanning (data collection, interpretation (information given meaning), and learning (action taken). Organizations will interpret data to reduce equivocality of interpretation based on organizational processes and will apply rules for interpretation in indirect correlation to the equivocality present. Daft and Weick (1984) state that organizations will use more rules with less equivocal information since the reduction in equivocality makes interpretation easier.

Whatever the process, information overload is a challenge to interpret information effectively (Hedberg, 1981). Although some organizations handle overload well, there is little in the research to describe why and how some firms can handle this problem while other cannot. Another challenge to the interpretation process is the rationality

of the organizational actors (March and Olsen, 1976). Interpretation of information and deciding what it means for the organization is a power-laden activity with potential for loss of organizational rationality (Pfeffer, 1992).

Organizational experimentation is another source of interpretation for organizational learning and also is a form of information itself (Hedberg, 1981). Simulations (deGeus, 1988) can be used to develop new information and to test existing theories of action.

Research Question 6: How Does an Organization Store and Retrieve Its Learning?

This questions covers the areas of organizational memory and information distribution. Organizational learning can be stored in individuals and in various organizational media such as standard operating procedures, routines, archival records (Dixon, 1992; Huber, 1991, Levitt and March, 1988). One of the challenges to organizations to is determine what they do know since much learning is localized to the organizational unit that acquired the information (Huber, 1991).

Much organizational memory is not embedded in tacit memory. Tacit memory is that memory which is recalled in behavioral responses without conscious effort but is not readily identified by individuals. Organizational culture

is one example (Dixon, 1992). With this type memory, it can be difficult to make the learning tacit so that it can be reexamined in a newer context. This problem supports the Argyris, Putnam, and Smith (1987) technology of action science to discover this embedded learning.

Computer-based organizational memory is another form of memory (Huber, 1991). There are multiple organizational databases which store information. However, since the technology is relatively new and constantly changing and improving, there is little research in using the technology for organizational learning.

Research Question 7: What Are Organizational Learning Products?

This question concerns the dissemination of learning to the organization. It is similar to information distribution. For the human resource development practitioner, training quickly comes to mind since training is an intentional process to transmit learning in concert with organizational goals to individuals.

Besides training, written communications, internal briefings and conferences, and house journals are all forms of information dissemination (Dixon, 1992). Unintentional means of information distribution, from the viewpoint of the

organization, include personnel transfers, job rotations, task forces, and informal networks (Dixon, 1992).

Summary of Organizational Learning Literature

The review of the organizational learning literature is difficult because of the lack of a agreed upon definition of organizational learning. Which disciplines own organizational learning? The literature includes works from organizational development, management, human resource development, sociology, and social psychology. Understanding organizational learning is difficult because of this very breadth of perspective. Organizational learning elevates all the challenges of understanding individual learning to understanding learning on a greater scale. What must be remembered when considering the work on organizational learning is that organizational learning is a process, not an end-unto-itself. Much of the literature seems to focus on making the process work without ensuring that the organization is focused on feasible goals or end-states. The French Army from 1919 to 1940 learned very well, but what it learned sowed the seeds of disaster (Doughty, 1985). There is very little in the literature which outlines implementation of successful organizational learning other than the works cited in the previous chapter.

Doctrine Literature Review

The Joint Chiefs of Staff Publication 1-01 (1988) defines military doctrine as the "fundamental principles by which military forces guide their actions in support of national objectives. It is authoritative but requires judgment in application" (p. viii). General Sullivan (1992), U. S. Army Chief of Staff, stated that doctrine "is so widely understood that is an important part of our institutional culture, a part of the fabric of the Army" (p. 3).

Sullivan (1992) goes on to state that "...doctrine is key to maintaining our warfighting edge over our opponents...doctrine plays a significant role in reshaping the Army for the future," (p. 4). Sullivan's combined comments articulate the Army's thinking on the central role of doctrine in everything the Army does to include weapons acquisition, training, and force development. Doughty (1979) states that doctrine guides action and suggests best methods to accomplish missions. Also, doctrine provides a common vocabulary to enhance communication among officers. Doughty (1979) adds that doctrine is the primary content of the Army service schools' curriculum.

Contrary to Sullivan's views which state the official Army position, Long (1991) asserts that doctrine "..reflects the biases and preferences of the people and organizations that write it," (p. 311). He further concludes that the

very organizational structures developed to write doctrine influence the final doctrinal product. This structural bias is a function of both the structure and the people inhabiting the structure as well as the decision makers who develop and staff the structure. Long's conclusions are based on a historical study of changes in Army doctrine over the past twenty years.

Romjue (1984), in an official Army history of the evolution from the 1976 doctrine of Active Defense to the 1982 AirLand Battle doctrine, posits that the new doctrine "...reaffirmed the maxim, true in tactical doctrine as in all human experience, that what is true must be repeated if it is not to be forgotten. AirLand Battle was a return to the tried and true principles of experience in war" (p. 73). He concludes that the Army returned to what it, as a culture, had always believed in. Sheehan (1988) states than the AirLand Battle Doctrine was a return to the traditional (prior to 1976 doctrine) that articulated what the Army must do to win, not how to do it, i.e doctrine as guide rather than dogma. There was a measured and explicit move from the operations research and management measurement criteria of the Vietnam War period to a renewed focus on the combat leader. Operations research did not allow for the unmeasured impact of criteria like morale, inspired leadership, and individual initiative which are part of the military legacy.

Herbert (1988), in his work on the development of the 1976 doctrine of Active Defense, states that the 1973-1976 period was seminal for the development of the AirLand Battle doctrine in 1982. He asserts that the new doctrinal manual was "...unlike any of its several predecessors. First, it established a new role for military doctrine as a key integrating medium for an increasingly complex military bureaucracy" (p. 1). Herbert continues that the organizational angst caused by the Active Defense doctrine was the source of its downfall, resulting in the writing of its successor - AirLand Battle doctrine.

Herbert asserts that doctrine is organizational choice based on current circumstances. Managing the choice process is a difficult task as various Army branches and agencies fight for their position and for the concomitant resources--budgets, personnel, and equipment, for example. This internal Army wrangling follows organization theory which asserts that the organizational elements do not disagree necessarily with organizational goals, but over the process to accomplish them (Shafritz and Ott, 1987). This is because organizational power is linked to those agencies who own the winning process. There is no clear use of a strategic planning model which links inputs through to organizational products and outcomes.

The Active Defense doctrine was personally written by General William Depuy, Commander of the Training and Doctrine Command, a very powerful figure, and other senior

officers (Herbert, 1988; Romjue, 1984). Herbert (1988) asserts that while Depuy created an Army belief in the centrality of doctrine, his method of writing doctrine excluded people with conflicting views from participation. "Whether today's or tomorrow's doctrine successfully fulfills the role first pioneered by Depuy and his contemporaries depends largely on whether today's leaders can learn from these officers' earlier experiences," (Long, 1991, p. 2). Long concludes that consensus building can be detrimental to a quality product. "A central and irreducible paradox emerges from this analysis: to reform the Army requires the Army's consent, but the Army's consent is most likely when the reforms are inconsequential" (p. 311).

Sheehan (1988) in his research on examining peacetime functions and changes of Army doctrine concludes that the most probable cause for changing doctrine is to take advantage of new technology for weaponry. This conclusion is based on a review of doctrine changes since 1950. He asserts that the US Army historically has won wars of attrition with massive amounts of firepower which minimizes risk to a conscript Army while maximizing US industrial capacity. Thus, a doctrine that emphasizes advanced weaponry fits the cultural norm.

Another major belief in the doctrinal manuals was a continuing emphasis on warfare in Europe. This emphasis was historically attractive since the Army has great European

success stories. Further, the European emphasis meets both the maintenance requirements of the Army and the political requirements of the various branches within the Army. However, the Army did not incorporate into its doctrine the lessons learned from non-European interventions. Sheehan (1988) states that "this attitude toward organizational learning is enigmatic when contrasted with the Army's considerable efforts to learn from the Yom Kippur War of 1973," (p. 376). The implicit Army belief is that past wars are of little learning value since technology so rapidly overcomes the learning value (Sheehan, 1988). Again, the emphasis on technology and weaponry becomes paramount.

Doctrine as panacea is Sheehan's final construct on why doctrine changes. He asserts that officers with their concerns about their ability to handle the uncertainty of being outnumbered, questioning their technological edge, and with their potential inability to execute warfare in a flexible manner, may look to doctrine as the supporting element that provides a sense of surety. This perception probably is valid for the time it was written, 1988, with the huge Warsaw Pact threat. With the demise of this threat, this premise probably is invalid.

It is worthwhile to note the perceptions of Army doctrine, in the 1993 version of FM 100-5, in the Department of the Army publication, Army FOCUS 93, and the December, 1993 issue of Military Review. The Army FOCUS 93 describes

doctrine as common framework and a common cultural perspective. It teaches how to think, not what to think. Doctrinal change is the engine of change, both intellectual and physical, for the transition from the end of industrial age warfare to the beginning of information age warfare. Doctrine is vital because of its central institutional role in the Army system in 1993. "The 1993 edition of FM 100-5 preserves most of the main points of AirLand Battle doctrine" states Major General Holder (1993) in his article in Military Review. Besides Holder's article, there are seven other articles which discuss the 1993 version of FM 100-5 and discuss its heritage with AirLand Battle. Each article is written by a senior leader who has the mission to employ the doctrine in the field.

General Gordon Sullivan (1993), United States Army Chief of Staff, summarizes the discussion of doctrine through the various professional journals as a:

> journey of continuous discovery where the power of thought and of the pen drives individual soldiers to understand their changing role within an Army whose own changing role is communicated by a new and ever-evolving doctrine. History, after all, has proved that learning organizations are winning organizations (p. 1).

CHAPTER III

Research Methodology

Introduction

The research for this study focused on the development and promulgation of AirLand Battle doctrine in the United States Army as stated in the 1982 Field Manual 100-5, *Operations*. This historically based study looked at the dynamics of organizational learning which lead to the adoption of the new manual six years after the Army's adoption of the Active Defense doctrine in 1976. Further, the study looked at how the new doctrine was transmitted to the Army. The guiding research questions were framed in a manner to determine if learning was effective (research question one which used the to the Kaufman (1992) Organizational Elements Model) and if there were elements which fit the Dixon (1992) learning model (the last six questions). By linking the responses to the research questions, it was possible to determine if effective organizational learning occurred.

Research Procedures

This was a historically based study using original and secondary source documents. The *Military Review*, published by the Army's Command and General Staff College, and the Training and Doctrine Command's annual historical reviews, provided a unique window to thinking about Army doctrine. A narrative of events helped to determine the direction of conceptual thinking within the Army.

At the start of research, some TRADOC historians convened in a brainstorming session and provided sources to use. Further, the historians in the US Army Training and Doctrine Command History office were available to provide additional insights into historical research methodology as research and writing evolved. The historians provided for an objective review of hist al methodology in terms of thoroughness and logic in the narrative.

The research focused on the research questions and the historical data was used to create a narrative to determine if a potential framework of organizational learning emerged. The intent was to determine if organizational learning could be discerned and to determine its dynamics. This research process attempted to show organizational learning in a *post hoc* fashion since the Army did not formally articulate that it was a learning organization.

The research procedure evolved as the historical research was conducted. An application of the Organizational Elements Model (Kaufman, 1992, 1988) followed an initial reading of the historical literature. This model links to research question one which asks if inputs and processes linked to products, outputs, and outcomes. Application of this model determines potential linkages between action and effect. Further, this model helps formulate inferences about whether or not the learning was purposeful, i.e. driven by outcomes, outputs, and products or was inputs driven. If inputs driven, then a case can be made that actions were adaptive rather than learned. A second search of the historical data attempted to determine plausible inferences, bounded by the research questions. The general format for the research was to create a narrative of doctrinal changes as they occurred, and then to determine if there were any central patterns or themes, such as the primacy of the offense, which can be described. Where practical, both methods of chronology and theme were used to create a valid picture of learning over time.

Using the descriptive narrative, it was possible to determine patterns or relationships and an overall organizational learning process by answering the specific research questions. Determining the patterns and relationships was the most difficult challenge. A pattern or thematic approach allowed for determining what was

learned or not learned, while simultaneously permitting inferences about learning processes.

A file of data from various historical records provided and summarized data elements. This data was then be sorted to discern patterns which fit the following benchmark: "To be successful and right, a selection must face two ways: it must fairly correspond to the mass of evidence, and it must offer a graspable design to the beholder," (p. 198, Barzun & Graff, 1985).

CHAPTER IV

Results

Introduction

The research problem is to determine the dynamics required for an organization to learn a new conceptual model to accomplish its mission. The purpose of this research is to examine the organizational learning dynamics of doctrinal change in the United States Army from 1976 to 1986. This chapter includes a brief history of the doctrinal change immediately prior to the research period, a chronological narrative of the 1976-1986 period, and responses to the research questions. The purpose of the narrative is to provide an overview of the entire period and to determine if a coherent and logical picture can be drawn. The research questions are answered after the narrative, and linked to information provided in the narrative, consider the existing data within a possible framework of organizational learning.

The Historical Antecedent to AirLand Battle- The Active Defense

With the publication of FM 100-5, *Operations*, in 1976, the Army worked intensely to ingrain the new doctrine in all

aspects of Army effort. The first action was command emphasis on reading and understanding the active defense doctrine. However, there was not universal support for this doctrine and critics began to speak out (Lind, 1977). A brief review of the development of the 1976 doctrine is important to understand the fomentation that its publication caused, and to understand the background that led to the development of the 1982 Airland Battle doctrine.

Although this research is focused on the period from 1976 to 1986 and AirLand Battle, the Active Defense doctrine, published in 1976, is a logical starting point to understand the period under study. Herbert (1988) asserts that the 1982 AirLand Battle doctrine was an evolutionary effort starting *from* the Active Defense concept, even though there were significant differences between the two. This evolutionary perception was shared by the authors of the 1982 manual (Wass de Czege and Holder, 1982). With the publication of the 1976 doctrine and the push from the Army's hierarchy for leaders at all levels to read, understand, and apply the new doctrine, the Army entered a period of doctrinal debate which focused attention on the Army and its missions. There was tremendous debate both inside and outside the Army about doctrine and a renaissance of thinking about ground warfare. "...the 1976 edition of FM 100-5 was distinctly different from its predecessors. It was a deliberate attempt to change the way the U.S. Army thought about and prepared for war" (Herbert, 1988, p.9).

Although the 1976 doctrine was never fully accepted by the Army, it created a new role for doctrine besides a simple in-house "how-to" manual. Herbert (1988) stated that the doctrine "..represented a new role for military doctrine as a key integrating medium for an increasingly complex military bureaucracy" (p. 1). Why was this new role necessary?

The Army formed the Training and Doctrine Command (TRADOC) in 1973 with General DePuy as its first commander. He asserted his new command's rightful position alongside the United States Army in Europe (USAREUR) and Forces Command (FORSCOM), the major troop command in the United States. Along with these internal Army environmental challenges, DePuy had to contend with external environmental challenges such as a decreasing budget from Congress and the negative legacy of the Vietnam conflict. DePuy watched Congress reject the funding for two Army weapon systems because of the Army's failure to articulate properly the requirement (Herbert, 1988; Depuy, 1979). Further, DePuy had to refocus the Army on its central mission of deterrence in Europe, and away from Vietnam. The European challenge was large (Herbert, 1988).

The problem of confronting a numerically superior Soviet Army in Europe was exacerbated by the lessons learned from the Yom Kippur War between Israel and Arab nations in October, 1973. This conflict caused tremendous consternation in the Army because of the tremendous losses

on both sides resulting from the increased accuracy of weapon systems, especially missiles, and the inadequacy of current doctrine to overcome these weapon systems. This war and its lessons were critical factors in the development of the Active Defense doctrine.

> "..the first thing the Arab-Israeli War did was to provide a marvelous excuse or springboard...for reviewing and updating our own doctrine. Some of the evidence coming out of that war was awesome. For example, the losses of equipment that occurred in a short period of time, and the fact that the Israelis ran more tanks through their maintenance system than the total number of tanks they possessed at the beginning of the very short war. The lethality and range of weapons and the tremendous importance of well-trained crews and tactical commanders...FM 100-5, therefore, partakes of the lessons on the Arab-Israeli War primarily in terms of the importance of weapons and weapons operators' proficiency and performance (DePuy, 1979, p. 190-191)."

Because of this "new lethality" and the ensuing losses, DePuy declared that the Army's objective was to prepare to win the first battle of its next war. This objective was required since he believed that the huge losses in the next conflict would cause a quick political solution and that U. S. interests would be served if the nation held a military advantage after the initial onslaught (Herbert, 1988). In other words, the first battle would be the next war.

Besides the new lethality, the United States, in the early 1970s, faced a numerically superior Warsaw Pact which was technologically equal. Warsaw Pact forces had continued with force modernization during the U. S. involvement in Vietnam. Thus, the Warsaw Pact was able to develop and

produce modern weapons and organizations. The Army now had to face a new lethality and had to prepare to fight outnumbered and win (Herbert, 1988).

Faced with these challenges, DePuy began a review of training and weapons development. He became convinced that the Army would have "..to think about combat as a problem of weapons systems integration" (Herbert, 1988, p. 35). He further determined that the Army must develop doctrine based on analytical scenarios approved by the Army leadership in 1973. This standard scenario and doctrine link would provide the data required to justify weapon systems procurement. DePuy also wanted doctrine developed that specifically told the Army "how to fight." Or as Herbert (1988) stated, DePuy made a conscious attempt to demystify doctrine from abstract considerations of previous doctrine manuals.

The development process for the 1976 FM 100-5 bore a decidedly DePuy trademark. DePuy, known for his quite specific views on the correctness of military actions and his impatience with those operating outside his view, is rightfully considered the true author of the manual (Romjue, 1984; Herbert, 1988). He initially tasked the Combined Arms Center, under Major General Cushman, to write the manual. However, DePuy took personal control of the development process after dissatisfaction with the initial drafts from Cushman's command (Romjue, 1984; Herbert, 1988).

Part of the dissonance was because of Cushman's and DePuy's backgrounds. "...Cushman's career could not have been more different from DePuy's unless it had been in a different Army" (Herbert, 1988, p. 52). DePuy was commissioned from the Reserve Officer Training Corps and served as a line infantry combat officer during World War II, with subsequent line assignments culminating with command of the First Infantry Division in Vietnam. Cushman saw no combat duty in World War II and had a series of assignments that gave him a "...reputation as one of the Army's real intellectuals" (Herbert, 1988, p.52). DePuy learned that leaders told soldiers what to do and enforced those directions, while Cushman believed in supporting individual creativity and initiative. DePuy's belief was based on his experiences with the Army during World War II, mainly filled with draftees, and he believed that he had to prepare to fight with soldiers with similar backgrounds, compared to a more professional army.

Further, DePuy believed that doctrine was

> ..a tool with which to coordinate the myriad activities of a complex organization...doctrine was an expression of the concepts against which researchers test Army equipment, as well as a channel of communication with to influence the activities and thinking of the field Army. Consequently, to change the Army, one changed its printed doctrine. The DePuy school held that the institution purposes of doctrine were as important as its substance and that doctrine should therefore be simple, clear, and specific (Herbert, 1988. p. 54).

The Cushman school, reflecting Cushman's intellectual bent, perceived doctrine as a search for truth. Substance was more important than institutional purposes. Doctrine was a guide to actions in combat and required judgment in application based on conditions (Herbert, 1988).

Such a difference in approach and opinion was unacceptable to DePuy, so he removed the responsibility for writing FM 100-5 from Cushman to himself. Thus, the fundamental concept of the 1976 doctrine was irrevocably linked with General DePuy, even though much of the work was done by Major General Donn Starry who commanded the Armor school (Romjue, 1984; Herbert, 1988).

To gain acceptance of the final doctrinal product, DePuy believed that the U.S. Air Force and the Germans were critical allies (Herbert, 1988). DePuy already had an ongoing dialogue with the Air Force through the Tactical Air Command located within a few miles of TRADOC headquarters at Langley Air Force Base, Virginia. He saw a critical link between Air force and Army combat activities to win the "Air-Land Battle, first officially mentioned as the title of chapter 8 of FM 100-5 in 1976" (Herbert, 1988, p. 68). There was continuous coordination between TRADOC and the U.S. Air Force during the development of the new manual. Thus, the Air Force was a key ally within the Defense community in gaining acceptance of the new doctrine. This link between TRADOC and the U.S. Air Force would provide a

sound foundation for further work in the development of Airland Battle in 1982.

DePuy felt that the German Army was another critical ally in gaining acceptance for his doctrine (Herbert, 1988). The Germans were vital to the North American Treaty Organization (NATO) in the defense of western Europe and the first battle would likely be fought on German territory. DePuy liked the German Army's concept of *panzergrenadier* to denote highly mobile infantry which was borne out during the Israeli-Arab 1973 war. These *panzergrenadiers* were to be used in a combined arms mode within an overall defensive framework. This concept of high mobility, together with DePuy's confidence in Major General Starry, resulted in DePuy's use of the Armor school as the lead for the new doctrine. The Germans focused on defensive actions because that was perceived as the only acceptable military action given the circumstances of politics and force ratios between NATO and Warsaw Pact forces. General DePuy agreed with this emphasis based on the given situation (Herbert, 1988). The Germans provided a continuing critique of the emerging American Army's doctrine and had a significant influence on the final product.

As the doctrine was developed, DePuy inserted the term "active defense" for the first time in American doctrine (Romjue, 1984; Herbert, 1988). The active defense, a highly mobile defense, became the sobriquet for the 1976 doctrine when it was not referred to as the DePuy doctrine. Although

the manual had a chapter on both offense and defense, the defense chapter set the tone for the manual and garnered the most attention:

> Because the manual had command interest and was available, attractive, and easy to read, the Army's officers read it. Not only did they read it and attempt to apply it, but they understood it, thought about it, talked about it, wrote about it, and eventually rejected it. That renaissance of professional discourse might have happened anyway, but it, in fact, did happen in direct response to FM 100-5 (Herbert, 1988, p. 98).

The criticism of the manual came from both inside the Army from the officer corps and from outside by civilian aides to Congress. The criticism centered around the emphasis on the defense, the perceived dismissal of the psychological elements of warfare in favor of force ratios, and the focus on Europe. DePuy published what he considered a sound doctrine based on the times within which it was written (DePuy, 1979; Herbert, 1988). He was successful to the extent that the weapons, later successfully employed under Airland Battle doctrine in *Operation Desert Storm*, were justified to Congress based on his doctrine. "DePuy came to recognize what doctrine should be, that is, an approved credible, overarching concept of how to wage war that permeates the Army and lends coherence to all its myriad activities" (Herbert, 1988, p. 106).

Development of Airland Battle Doctrine

General Depuy, the acknowledged primary driver of the 1976 doctrine, retired from the Army within a year of its publication and General Starry took command of the Training and Doctrine Command in 1977. Although Starry had been the Commandant of the Armor School at Fort Knox, Kentucky during the initial writing of the 1976 manual and was a staunch ally of DePuy's efforts, he brought fresh insights into the challenges facing the Army in Europe. After leaving Fort Knox, Starry took command of V Corps, one of two U. S. Army corps in Europe. He personally had experienced the issues of implementing the Active Defense in Europe.

Starry provided the concept of winning the corps battle, then the central battle, rather than winning the first battle, which DePuy had espoused (Romjue, 1984, TRADOC, FY 78). His rationale was that the Soviets posed a different threat than just the classic breakthrough maneuver (Romjue, 1984; TRADOC, FY78). The Soviet forces were arrayed in echelons and, if the U.S. Army commanders only focused on the initial battle, they would have insufficient forces to counter the follow-on Soviet echelons. Starry ran numerous war games while the V Corps commander and discovered this issue. He conducted these war games using a "battle calculus" composed of "target service data" based on kill rates of various weapon systems and force ratios

(Romjue, 1984). He also used historical input. In short, as a corps commander, Starry discovered weaknesses while applying, or being unable to apply, the Active Defense (Sheehan, 1988).

As the new TRADOC commander, Starry determined to address the weaknesses he had uncovered. He described a requirement to have a battle technology plan to address them. This plan would provide an analytical planning framework to work on the central battle. He also changed DePuy's time frame from immediate to an eight-year look. (Romjue, 1984; TRADOC, FY78)

The battle technology plan became the Battlefield Development Plan, using the corps as a base planning unit. Along with the increased time span, Starry was concerned about integration of new weapons and technologies on the battlefield since these systems would arrive within the planning timeframe. He added the aspect of "looking deep" to see enemy follow-on echelons and counter them. He coined the phrase, "force generation", which evolved to integrated battle, to provide the concept of addressing these forces. Thus, the central battle and force generation with integrated battle were critical elements of the overall Battlefield Development Plan (Romjue, 1984; TRADOC, FY78).

Evolution of Doctrine from Active Defense to Airland Battle				
Active Defense	Intervening Variables and Concepts			AirLand Battle
-Win first battle----------	Corps battle, then Central battle------	Integrated battle----------	Extended battle------	--Deep Battle
-Soviet breakthrough tactics----------		Soviet echelonment----------		--Operational level
-Perceived defensive emphasis--------		Deliberate change----------		--Offensive emphasis
-Weapon systems focus----------		Deliberate change in focus based on history-----		--Human dimension

Table IV - 1

Table IV-1 provides a graphic illustration of the sequence of changes. It must be remembered that the Battle Development Plan was the formal planning process used to determine the various changes shown in the table. Further, all the developmental changes were linked to the evolving umbrella concepts of corps battle, central battle, integrated battle, extended battle, to deep battle and the overall AirLand concept.

The Division 86 and the ensuing Army 86 studies resulted from the Battlefield Development Plan efforts. These studies focused on functional aspects of the heavy division (Division 86) and corps, echelons above corps, plus the light division (Army 86). These studies followed the format of the Battlefield Development Plan and drove many doctrinal issues (TRADOC, FY78; TRADOC, FY79).

Because doctrine was gaining added attention and because the Battlefield Development Plan efforts and the 86 studies were creating new doctrinal issues, General Starry created the Office of the Deputy Chief of Staff for Doctrine (ODCSDOC) in 1979 (TRADOC, FY79). This placed doctrine on an organizational footing equal to training and combat developments (the development of organizations and equipment). Doctrine formally had arrived in the organizational structure and the bureaucracy (Romjue, 1984). Starry (1983) stated that he formed the doctrine office because of the lesson from the 1976 development effort that TRADOC had a poorly designed institutional framework to accomplish change. Starry wanted a person responsible for identifying the requirement for change and for describing the conceptual framework of the change itself.

Concurrent with the formation of the doctrine office, Starry articulated a new doctrinal development process. This process used "operational concepts" which are tested and, once approved, become doctrine. Starry

> ...defined doctrine as "what is written, approved by an appropriate authority and published concerning the conduct of military affairs". An initial concept proceeded to operational concept by states: concept statement, expansion into an interim operational concept, evaluation, and, lastly, approval and issuance as an operational concept. Once published, it served as the basis for analysis, evaluation, and development of relevant doctrine. It was the basis for field manuals, and for the development of equipment, organizations, and training required to prepare individuals and units to employ the concepts in battle (Romjue, 1984, p. 29).

The Concept Based Materiel Acquisition System was started in 1980 as a follow on to the previ s doctrinal concepts initiatives (TRADOC, FY80). This system evolved into the Concepts Based Requirements System (CBRS) and a TRADOC CBRS regulation was published in 1982 (Romjue, 1984). In theory, this process used the inputs of mission, threat, technology, and history to sustain a "deliberate, logical self-proving procedure to mature an idea or concept into eventual doctrine, but also provide for a concept basis for all development - doctrine, training, force design, and materiel requirements" (TRADOC, FY 83-86, p. 75). The idea was to determine Army needs, "gaps between current results and desired results" (Kaufman, 1991, p. 15), and determine a solution to close these gaps in terms of changed or new doctrine, training, organization, or equipment.

Starry initiated the formal doctrinal literature program (Romjue, 1984). This was a means of sending operational concepts to the field for the analysis and evaluation processes, plus the promulgation of approved doctrine. This doctrinal literature program was a follow-on to the training literature program and various "how-to-fight" manuals that had been written and disseminated following the issuance of the Active Defense doctrine. The literature program was an additional means to communicate doctrinal changes throughout the Army. By formalizing the program, the Army provided the required staffing and funding to accomplish the program's goals.

Along with the new doctrinal literature program, Starry directed his service school commandants to start writing a new set of "how-to-fight" manuals using the data provided from the various 86 studies (TRADOC, FY 80). A new management structure for service schools' doctrinal development was approved to link school instructors with doctrine. The TRADOC organizational School Model issued in 1976 had severed instructors from doctrinal development responsibilities; Starry wanted the same people who taught the Army to write the Army's doctrine. The formal Doctrinal Literature Program made Starry's desires official (TRADOC, FY 80). Also, the doctrinal literature management and writing of selected field manuals (like FM 100-5, *Operations*) was transferred to the Combined Arms Center and the Command and General Staff College at Fort Leavenworth, Kansas.

External events also drove the Training and Doctrinal Command to revise doctrine. The Carter Doctrine was pushing the Army into contingency operations outside the European scenario. General Edward Meyer, U. S. Army Chief of Staff, stated "..the most demanding challenge confronting the U.S. military in the decade of the '80s is to develop and demonstrate the capability to meet threats to vital U.S. interests outside Europe" (Romjue, 1984, p. 39). Meyer was not sure that the 1976 doctrine would apply outside the European theater, especially considering the defensive tone.

If the Army was to project itself through rapid deployment, the Army would require a more offensive nature.

Also, there was continuing written criticism of the 1976 doctrine from outside the Army, as well as from the inside. A Congressional staffer, William Lind, wrote a biting review of the doctrine and stated that the emphasis of firepower over maneuver was wrong (Lind, 1977). He also took exception to the basic tenets of winning the first battle and fighting outnumbered and winning. He questioned the lessons learned from the Arab-Israeli War and their application in the doctrine. There were others, including some NATO allies, who wrote critically about the defensive tone of the doctrine, as well as the "first battle" orientation. They disagreed with the depiction of the Soviet breakthrough maneuver as the primary threat, the lack of tactical reserves, and the emphasis on firepower (TRADOC, 1979).

Interestingly, Starry (1983) wrote, in a discussion about change, that "we (the Army) would be much better served, in the long run, if we could learn how to change our institutions from within instead of creating the circumstances in which change is forced on us by civilian secretaries of war, defense or whatever" (p. 27). He continued by stating that there is a requirement for institutional leadership, as well as individual leaders, who can support intellectual endeavor and the ability to think

logically about tough problems. Starry appeared to infer that there was insufficient Army capability in these areas.

Over and above the criticism, both internal and external, and the new missions outside of Europe, TRADOC was still struggling with the Soviet echelonment issue. The echelonment issue dealt with the Warsaw Pact tactic of using successive waves or echelons of forces in the attack. These echeloned forces were separated by time and space and provided the Soviet commanders the ability to exploit success. How were Army commanders to contend with the first echelon Soviet troops and have sufficient capacity to defeat the second and succeeding echelons? General Starry responded by "extending the battlefield" (Starry, 1981). By extending the commander's conceptual model of the battlefield to include the echeloned Soviet forces, commanders had to interdict these succeeding echelons. But, how were they to do so? Extending the battlefield meant increasing its depth, both in space and time. Along with this increased depth, there was the requirement for intelligence to acquire these targets and for a means to defeat these forces with fires (actual enemy engagement by various weapons systems) or maneuver (Starry, 1981; Romjue, 1984).

Coupled with this interdiction issue was the use of nuclear and chemical weapons on the battlefield. The idea of interdicting deep targets which were not in close contact with friendly forces allowed for use of these controversial

weapons. DePuy had dismissed the use of nuclear weapons in the 1976 doctrine because he believed that the Army would never get Presidential authority (Herbert, 1988). However, by late 1980 the Soviet chemical threat had become very apparent, as well as the nuclear threat (Brown, 1980; Andrews, 1980; Buzzell and Rose, 1981). Army planners felt that the full use of all weapons within the U.S. arsenal had to be considered integral to the battle. Only if these contingencies were planned in advance could they be executed on the battlefield in a timely manner, considering the delay resulting from the presidential authority required (McKinney, 1981).

Following the operational concept development process described earlier, the Army fielded the AirLand Battle concept in early 1981. This paper articulated many of the points that have been elaborated here -- the extended battlefield, use of chemical and nuclear fires, a more offensive orientation, a focus on winning any conflict involving U.S. military action, a renewed emphasis on the human dimension of warfare, and less emphasis on firepower (Romjue, 1984).

With the publication of the concept paper, the Army community had a sufficiently detailed guide to communicate the evolving doctrine. Contrary to DePuy's method of writing doctrine at the highest level and coordinating with just a few senior leaders, the ensuing development of the AirLand Battle doctrine was a very open process (Romjue,

1984). Leavenworth sent briefing teams out to discuss the evolving doctrine. Copies of draft doctrinal papers were furnished to people outside the Army community--Lind, for example. There also was a briefing to Congress. The process, as well as the written product, was well received.

TRADOC started an AirLand Battle study in 1983, after formal publication of the revision of FM 100-5, to determine the impact of the doctrine on the conduct of combat operations. The Combined Arms Center conducted this classified wargaming study with assistance from TRADOC service schools, the Army War College, The Army Materiel Command for technical equipment data, and the Air Force. This comprehensive study provided relevant information for application of the new doctrine, including some adjustments, but there was no compelling data which required development of a new doctrine (TRADOC, FY 83-86).

With the publication of the official manual in 1982, the Army already had gained goodwill and support because of its earlier efforts (Romjue, 1984). The Army now faced the challenge of promulgating the new doctrine. General William R. Richardson, who took command of TRADOC in 1983, insisted on getting doctrine to the field quickly (TRADOC, FY 83-86). The Doctrinal Literature Program was moved to TRADOC headquarters, and quickly produced field circulars designed to meet General Richardson's order. The change in the doctrinal literature program gave a better oversight for doctrine development resources, both dollars and personnel.

The field circular expedient attempted to solve the challenge the Army had in integrating all the changes occurring in units. Units were getting new equipment before the doctrine for it was ready. Although new equipment training teams conducted briefings at the units, these teams did not solve the problem (TRADOC, FY 83-86). Because of the time required to publish a field manual which would provide the doctrine, field circulars were published as an interim measure (TRADOC, FY 83-86). This expedient was short lived because these circulars created as many problems as they solved. There were problems in quality, in distribution of circulars to the field, and in cost (TRADOC, FY 83-86). Further, there was concern that field circulars upset the careful process of disseminating doctrine through field manuals. In 1986, General Carl Vuono, the new TRADOC Commander, told schools to focus on field manuals. However, from October 1983 to December 1986, 263 field circulars had been published (TRADOC, FY 83-86).

Another major issue was integrating training literature with doctrinal literature. General Richardson stated that doctrine must govern training (TRADOC, FY 83-86). Further, the training was to be standardized so that a soldier transferred from one unit to another would learn the same procedures at both locations. TRADOC service schools had to develop and write the necessary training publications, coordinate them with other schools and services, and distribute them. However, the problem was exacerbated by

branch parochialism when schools were tasked to solve the challenge of training combined arms and other horizontal integration training issues (TRADOC, FY 83-86). "Combined arms" meant the integration of armor, infantry, artillery, intelligence, engineers, aviation, and other branches to produce a synergistic effect on the battlefield. "Whereas the lessons of war taught combined arms on the scene in wartime, that teaching agent was absent in peacetime, when branch interests came more to the fore, as each branch developed its equipment, doctrine, and organization" (TRADOC, FY 83-86, p. 89). A study was started in 1986 and completed in 1987, which aimed to bring doctrinal and training literature into alignment.

There was frustration with the implementation of the new doctrine. Lieutenant Colonel Cope (1984) stated that published doctrine requires transformation in applied doctrine. He asserted that there was strong skepticism about the ability to implement the new doctrine at division and below. because there had been little emphasis placed at that level. He recommended unit training programs founded on the new doctrine and supported by ranges and maneuver space amenable to AirLand Battle concepts. He followed with the requirement for senior tactical leaders and the local command environment to endorse and enforce the new doctrine, especially the concept of initiative.

> One byproduct of the recent revision of Field Manual (FM) 100-5, *Operations*, was a better appreciation of what the combat competency of

> battle leaders must be. It is clear that AirLand Battle doctrine cannot be executed by Army leaders who do not understand the human dimension of combat, are not trained in the proper employment of modern hardware and systems, and are not educated to employ them with sound judgment (Wass de Czege, 1984, p. 4)

Wass De Czege, one of the authors of the 1982 manual, was the first director of the Advanced Military Studies Department, Command and General Staff College. The department conducted a second year program for selected staff college graduates to provide the education which Wass de Czege described above. This program was described by Army leaders as an investment in the Army's intellectual future and the graduates from this program were assigned to billets in operations shops at corps and division level, initially. As the program expanded, graduates were assigned to low-level units. The Advanced Military Studies Program (AMSP) became a coveted assignment by Army officers (and Air Force officers who constituted 15 per cent of later classes). During *Operation Desert Shield/Desert Storm*, a planning cell of AMSP graduates developed the actual plans and orders.

By 1985, as the Army gained experience with AirLand Battle doctrine and with the doctrine development process, Army leaders decided to update the 1982 manual. Holder (1985) stated that it was a second edition of current doctrine rather than a revision. The 1985 edition provided added material on the operational level of war, on corps

operations and on low-intensity conflict and the use of light forces.

Research Question 1: Did the Army Link Inputs and Processes to Products, Outputs, and Outcomes?

This question uses the Kaufman Organizational Elements Model (OEM) to determine the effectiveness of organizational learning to meet organizational and societal goals (Kaufman, 1992, 1988). The model is a five step flow of inputs and processes which produce, in progression or sometimes in staged sequences, products, outputs, and outcomes. An example is a hospital which has the following application of the model (Kaufman, 1988, p. 52):

Organizational Elements Model				
Inputs	**Processes**	**Products**	**Outputs**	**Outcomes**
Nurses Ambulances Budget Buildings Beds Physicians	Drug Therapy Surgical operations Physical Therapy	Elimination of disease Removal of growths	Discharge of patient	Return to health Patient returns to work Patient dies

Table IV - 2

The rationale to apply this model is that organizational learning, per se, is meaningless unless it enables an organization to perform more effectively not just efficiently. Did the Army create a doctrine that enabled it to perform its missions more effectively, and did organizational learning contribute?

For the Army, inputs included budget authorizations from Congress, missions from the chain of command, new and existing personnel, equipment, intelligence data. Processes included training, doctrine development, combat development (development of organizations and equipment), operational planning. Products included doctrine, unit structure to include people and equipment authorized, trained soldiers and officers, and operations plans. Outputs were combat ready units, ready reserve units, a mobilization capability, and successful conduct of war, if necessary. An outcome would be world peace and overcoming and neutralizing enemy threats. Outputs were the products delivered to society and outcomes were the effects of the outputs.

Organizational Elements Model - United States Army				
Inputs	**Processes**	**Products**	**Outputs**	**Outcomes**
Missions Budgets Personnel Equipment etc.	Doctrine development Training Combat development Operational planning etc.	Doctrine Unit structure Trained personnel Operations plans etc.	Combat ready units Ready Reserve units Mobilization capability Successful conduct of war, etc.	Overcoming, neutralizing threats World peace etc.

Figure IV - 3

An organization can use this OEM framework to determine the gap between what exists and what is desired for each element and their linkages. An organization can define the quantity and quality of existing inputs and desired inputs, personnel for example, (see figure IV-2) to identify existing organizational weaknesses or strengths. Gaps can be identified for each block within the model. This process (Kaufman, 1992) provides a focused approach to determine organizational needs (gaps in resluts) and then prioritize them. Planners should identify outcomes and work through outputs, products, process and inputs, in that sequence, to determine the requirements for each stage of the model. Thus, an organization can determine its correct objectives

with a logical procedure to determine effectiveness both for the organization and society. By including the societal impact in determining organizational effectiveness, an organization can determine if what is effective for the organization is also effective for the society within which it exists. For example, one may develop a superb and successful Army, but the cost may be so great that it critically weakens the nation economically and thus threatens its survival. Is this really an effective solution? One could assume that the leaders of the former Soviet Union said, *nyet*.

General DePuy did see a link between doctrine and inputs because he saw a requirement for a doctrine to provide the rationale, in quantitative terms, for new equipment to Congress (Herbert, 1988). Congress previously had rejected two new systems for the Army because of weak justification through failure to articulate the costs of not acquiring the systems (Herbert, 1988). As part of the establishment of TRADOC, DePuy brought the combat developments function into the realm of the war fighters and away from engineers and contractors. After putting the combat developments mission into the service schools, DePuy wanted each school to articulate its concept of warfighting. And how did the Army, as a whole, want to fight? How the Army fights was Army doctrine. Thus, DePuy started with a requirement to modernize training and the Army's weapons systems, and ended up writing doctrine. However, weapons

system modernization was not the sole factor driving the requirement for doctrine during DePuy's tenure.

Contrary to starting with inputs and ending up with a doctrinal product, as DePuy had done, Starry formulated a different approach. He used operational concepts as a statement of a general conceptual capability which would lead to doctrine after successful testing, approval, and acceptance. These concepts and the ensuing doctrine formed the "basis for field manuals, and for the development of the equipment, organizations, and training required to prepare individuals and units to employ the concepts in battle" (Romjue, 1984, p. 29). Thus, Starry's concept-based system started with perceived organizational capability requirements and, after a development process, determined products and outputs required to obtain victory on the battlefield. However, there was a minimal link to outcomes by the Army. This may have been caused by the constraints placed on the Army through the Congressional appropriations process.

Similarities do exist between the Army's Concept Based Requirement System (CBRS), started in 1980, and Kaufman's Organizational Elements Model, except there was no societal or mega-level in CBRS. In CBRS, fiscal restraints were applied in the prioritization process where resources were applied to solving problems until there were no resources left. Any needs which were not addressed in the fiscal year were part of the requested budget program for future years.

Research Question 2: What Motivated the Army to Learn?

> The Army's broad operational doctrine--how it views present-day war and how it plans to fight--has changed substantially in the past decade. Most of this change has reflected professional efforts to adjust doctrine to experience (Vietnam, the Middle East Wars), to accommodate technical change (airmobility, computers, precision-guided munitions, long-range sensors) and to deal effectively with the chief threats (the Warsaw pact, North Korea, Soviet-sponsored insurgencies) (Holder, 1985, p. 50).

There were several motives to learn, including a changing threat, changing missions, and professional discontent. A changing threat motivates ongoing learning, especially if the evolving threat successfully countered existing Army doctrine. Just as the U.S. Army was developing new doctrine based on the Arab-Israeli war of 1973, so too was the Warsaw Pact (Herbert, 1988; Romjue, 1984).

The 1976 doctrine was based on classic Soviet breakthrough scenarios (Herbert, 1988), but the Soviets were changing. Intelligence data gathered through observation of Soviet training exercises depicted changing tactics which showed a movement away from the classic breakthrough maneuver. If this shift were true, the analytical basis which was used to develop the Active Defense was no longer valid. New analyses were required and General Starry conducted them, both while commanding V corps in Europe and

as Commander, TRADOC. The results indicated serious deficiencies with the doctrine, especially in countering the second echelon threat (Romjue, 1984; Herbert, 1988; TRADOC, FY 78).

Changing missions, based on evolving threat scenarios from other than Warsaw Pact nations, were another motivation to learn. With the Iran hostage crisis of 1979 and the general turbulence in the Middle East, President Carter stated that southwest Asia was an area of national interest. Other regional conflicts, like Afghanistan, created a mission for the Army to deploy and protect national interests in these third world conflicts. Deployability created a challenge to the Army because of its forward presence concepts in areas like Europe. The Army required a doctrine of deployability, plus the organizations and equipment to accomplish this mission. The 1976 doctrine, with its armor-heavy battle forces focused in Europe, did not provide the wherewithal to meet the new mission (Romjue, 1984).

Professional discontent was a third motivation to learn. The Army officer corps never fully accepted the active defense doctrine (Herbert, 1988). One reason for this lack of acceptance was the perceived focus on the defense. In most officers' eyes, the purpose of defense was to avert defeat, while the offense was designed for victory. Why would an army fight, if not for victory? The Army had suffered greatly from the then-recent Vietnam experience

where victory was elusive (Herbert, 1988). As a result, General Meyer, Army Chief of Staff, directed TRADOC to think about revising the 1976 doctrine (Romjue, 1984).

Research Question 3: Who Learned the Requirement?

When the Army Chief of Staff, Meyer, recommended that TRADOC consider revising the 1976 doctrine, he recommended the possible revision because of the requirement to address other potential theaters of war besides Europe (Romjue, 1984). As noted, TRADOC Commander Starry already had discovered problems with the 1976 doctrine during his tour as a corps commander in Europe. Initially, Starry wanted to simply revise the doctrine, but as the scope of required change increased, he determined that a new doctrine was required (Romjue, 1984). Part of the increased scope dealt with the concepts of the extended battlefield, the central battle, battlefield interdiction, and the integrated battlefield.

External to the Army, critics of the 1976 doctrine stated that it focused too much on firepower and negated maneuver (Lind, 1977). Lind was a powerful critic because he was a member of Senator Gary Hart's staff. Senator Hart was a member of an influential Congressional Military Reform caucus which was critical of defense efforts. Lind also took exception to the emphasis of winning the first battle since

he perceived that this emphasis did not allow any effort for any ensuing battle (Lind, 1977). Lind was heard and TRADOC responded in a rebuttal, "TRADOC's Reply," in the *Armed Forces Journal*, October 1976.

Research Question 4: How Did the Army Learn From the Environment?

Before discussing how the Army learned from its environment, both internal and external, the Army's internal and external environments must be described. Between 1976 and 1986, there were 16 service schools and three integrating centers internal to TRADOC. Although some service schools were located on installations not commanded by TRADOC, most service schools had their own installation, such as on Fort Benning, Georgia, (the Infantry School). Thus, there was a concerned local community and congressional delegation identified with each school and installation. Service school institutional interests, even though contrary to TRADOC wishes, could be pushed at the congressional level (Long, 1991). TRADOC was a four-star command nominally equal to other Army major commands such as the Army Materiel Command, Forces Command, United States Army in Europe, Southern Command, etc. However, commands like Europe and Forces Command in the continental United States carried great weight and their support was critical

to acceptance of major TRADOC initiatives. All these commands reported through the Department of the Army staff at the Pentagon.

The Army's external environment included "sister" services like the Air Force and Navy who were competitors in budget battles before Congress. All of the services reported through the Department of Defense with senior positions at the Department level held by civilians appointed by the current President. These civilians were not required to have any military experience or background, compared to the military senior leadership who had extensive military backgrounds in their respective services. The President, Commander in Chief, and Congress were key players in the Army's external environment.

Within the United States, the Army's environment included the civilian population, Army veterans, and economic players like equipment vendors and contractors. The Army's external environment also included allied nations and their armies, plus threat nations and their forces. Technology was an environmental factor also. History and tradition were both internal and external environmental factors. Thus, the Army had a tremendous range of environmental factors to scan.

As mentioned above, by 1980 the Army had developed the Concept Based Requirements System which, in theory, looked at the Army's missions, history, the threat, and current and future technology as the starting point in determining Army

requirements. This analytical approach provided a form of environmental scanning to determine what could impact the Army.

The Army's procedure for learning from the environment for the period from 1986 to 2016 illustrated how the Army had institutionalized its doctrinal search processes. In 1986, the TRADOC Commander stated that TRADOC would be the Army's architect for the future. To meet this challenge TRADOC would use the Concept Based Requirements System (CBRS) methodology.

"..TRADOC would call upon other agencies for certain invaluable contributions as it developed concepts and doctrine in the architecture of the future framework" (TRADOC, FY 83-86, p. 97). These agencies included Army intelligence agencies, the Central Intelligence, and the National Security Agency to define the threat. The Laboratory Commands and the Department of the Army Research Projects Agency provided technology. Army strategy and missions would come from the Army War College, the Strategic Studies Institute, and the Department of the Army. Historical perspective was to be provided by the TRADOC and Army historical network, including the CAC (Combined Arms Center) Center for Army Lessons Learned (CALL) and the Combat Studies Institute. Both CALL and the Defense Advance Research projects Agency would provide information on projected operating environments (TRADOC, FY 83-86,).

Research Question 5: What Were the Interpretation Systems?

This section concerns how the Army interpreted the information received. The Army's military intelligence community uses a two step model to describe the military intelligence effort. First information is gathered, then it is interpreted. Once interpreted, it is considered intelligence. The second step of this model is discussed here.

The Army received data from multiple environmental sources. However, the Army had to interpret the data and place it into the Army's context before it had meaning. Thus, interpretation systems were considered vital to organizational effectiveness because history was replete with examples of ignoring critical information or failing to make the correct interpretation.

One interpretation system was the Army's intelligence agencies, plus other military and national intelligence agencies. Their intelligence focused on gathering intelligence about potential threat forces, to include size, state of readiness, weapons systems, doctrine, etc. Also, they gathered intelligence on other factors, like economic conditions, to determine possible strategic courses of action for the nation under study. The majority of this intelligence was classified, but Army decision makers had access as required by their duties.

Another interpretation system was war games, exercises, and simulations. Computers had greatly increased the capability to conduct sophisticated simulations which tested doctrine and organizations against a realistic enemy under relatively realistic conditions. The value of these simulations was so great that TRADOC formed several agencies responsible for these simulations and the ensuing analysis. The agencies included the Combined Arms Operations Research Activity and the TRADOC Analysis Command (TRAC) formed in the early 1980s. The Army conducted many exercises, both Army-only and joint exercises with sister services, as training and testing vehicles. The issues raised from simulations and exercises were formally recorded and sent to appropriate agencies for resolution. Some of the issues discovered by the exercises above were entered into the Concept Based Requirements System (CBRS) for resolution.

Another interpretation system was the Army historical community's continuing historical analysis. The Army's historical community included, for example, the Center for Military History; the Office of the Command Historian, TRADOC and his staff and other major command history offices; and the Combat Studies Institute at the Command and General Staff College, Fort Leavenworth, Kansas. This community provided a wealth of battle analyses, special studies, and organizational histories which provided some historical input into the CBRS as well as for teaching purposes at Army service schools.

Another interpretation process was the evaluation of performance at the National Training Center (NTC), Fort Irwin, California. The NTC was an instrumented, live force-on-force mock battle facility which used laser weapons to simulate actual weapons firing. Various agencies, to include Rand Corporation and TRADOC service schools, would use the data generated from the mock battles to determine the efficacy of doctrine, training, organizations, and equipment. Again, like the issues raised from exercises and simulation, unresolved issues from the NTC were place into the CBRS process (Chapman, 1992).

In 1984, the Army formed the Center for Army Lessons Learned (CALL) to generate lessons learned from exercises and the NTC, plus other sources, and disseminate these lessons to the Army at large (TRADOC, FY 83-86). Part of the impetus for this organization was Congressional perception that the Army, as a whole, was not learning from the various units' experiences at the NTC (Chapman, 1992). Congress had hoped that the high cost of the NTC would be offset by increased unit performance. CALL was formed as an organization tasked to disseminate the learning. CALL did not interpret the issues raised. They identified the issues, tasked the appropriate agency for resolution, and published the results. They created a computer database of issues and lessons learned and provided toll free telephone access to the database, and published a CALL newsletter of lessons learned.

Research Question 6: How Did the Army Store and Retrieve Learning?

This question parallels the concept of organizational memory discussed in the literature review. The Army's had an ongoing historical program which, and along with writings from civilian historians about history, was readily available to the Army. The Army made the historical data available to soldier, not just the lessons learned or routines, as discussed in civilian institutions. Because the history itself was available, the user could determine the value of lessons learned based on the context of the situation. In theory, through the study of history, an officer could understand why a particular lesson worked in one circumstance and did not work in another. The concept of learning from history was to learn general principles, not dogma.

Written doctrine itself was a form of organizational memory. Because doctrinal manuals were derived from organizational learning processes, they represented the Army's choice for how best to conduct its activities (Herbert, 1988). The Army Doctrinal and Training Literature Program (ADTLP) funded the writing, publication, and distribution of both doctrinal and training manuals throughout the Army. These documents formed the cornerstone

of learning in resident training at Army service schools. Therefore, students in the schools should receive the most current doctrinally correct training. However, this training was not validated against performance in the field Army since service schools received decreased funding for their external evaluation. The only exception to this were the senior people who had completed all their formal Army education.

The various Army and Department of Defense databases were another source of organizational learning storage. The Center For Army Lessons Learned was one Army database, while the Defense Technical Information Center (DTIC) represents a Department of Defense source. The DTIC was on-line to military libraries and would provide written copies of research reports and other written information stored at DTIC. Army Research Institute (ARI) studies were examples of information stored at DTIC. The TRADOC library system with all the service schools and integrating centers provided additional information upon request through interlibrary loans. All doctrinal and training publications were available through the latter system.

The Army's publications, including *Military Review* from the Command and General Staff College, *Infantry* from the Infantry School, *Armor* from the Armor School at Fort Knox, Kentucky, and other professional publications provided information. *Army*, while not a formal Department of the Army publication, was published by the Association of the

United States Army (AUSA) and was used to communicate various Army actions and changes. All these journals were used to articulate doctrinal changes and provided an open forum for debate and discussion.

Another means of storing and retrieving organizational learning was through organizational manning changes. For example, in infantry and armor battalions, the unit S2 (intelligence staff officer) position was filled by an infantry or armor officer. The authorization table was changed to fill this position with a military intelligence branch officer. This provided the battalion commander with a fully qualified intelligence staff officer who could tap all possible intelligence assets and provide quality intelligence preparation of the battlefield. This change also provided the military intelligence community with a network of military intelligence officers throughout the Army who could support the military intelligence community's collection requirements.

Research Question 7: What are the Learning Products of Doctrinal Change?

> One of the serious problems in planning against American doctrine is that the Americans do not read their manuals nor do they feel an obligations to follow their doctrine. (From a Russian document. This quote found on a U.S. Army office wall.)

The above quote, although not necessarily accurate, describes the difficulty in distributing doctrine to the field. It is interesting to note that General DePuy, while talking about the 1976 doctrine, stated in a letter to General Fred Weyand, U. S. Army Chief of Staff:

> It will be two more years before all of the hierarchy of manuals and supporting literature will be properly aligned with FM 100-5. The critical manuals for the combat arms have first priority. It will be several more years before 51% of the commanders in the Army -- Generals through Captains -- operate instinctively in accordance with the principles of FM 100-5. At that time, it will be genuine doctrine (Romjue, 1984, P. 86).

The Army Doctrinal and Training Literature Program (ADTLP) which funded the publication and distribution of these learning materials was one program which provided a number of products. The Military History Education Program (MHEP) created a framework for learning and using military history in Army service schools.

The Military History Education Program (MHEP) was started to provide a career-long use of military history as both a training method in service schools and as a means for professional self development. To support this program, military historians were assigned to each of the service schools to provide resident expertise and as an additional teaching faculty member. For officers, there were recommended blocks of instruction within each course of

instruction (officer basic course, officer advance course, Command and General Staff officers Course, etc.). Military history was place into the Military Qualification Standards (MQS) which was a program designed to articulate required performance levels for each stage in an officer's career and to evaluate that performance. The history input to the Military Qualification Standards included recommended readings while the officer served in the field. Military libraries were directed to have sufficient copies of recommended reading books to support the program. Further, Major General Dave Palmer, Jr., as Deputy Commandant, Command and General Staff College in 1985, pushed the Army and Air Force Exchange System which operated the post exchanges an Army post to stock military history books for sale. (Post exchanges had taken over the military bookstores at service schools and had stopped stocking many historical works because they did not sell very well).

Another learning product was the Military Writing Program instituted in service schools. The Airland Battle doctrine required commanders and staffs to fully articulate the commander's intent when giving operations orders. However, over time, Army operations orders had become very cryptic with little explanation. As the Army attempted to inculcate the new doctrine into the field Army, the Army discovered the inability of commanders and staffs to fully articulate the commander's intent in writing. Thus, TRADOC

instituted the writing program in service schools to enable officers to write better.

Other learning products were the common cores instituted in officer basic courses (OBC) and officer advanced courses (OAC). These courses were taught at each branch school and trained officers to perform their branch duties as lieutenants and captains. However, when these officers had to operate together they often had no common vocabulary and demonstrated an inability to communicate tactically. General William Richardson, Commander, TRADOC, October 1983 - June 1986, directed that a common core be developed and taught at all officer basic and advanced courses to solve this problem.

Service school programs of instruction were another learning product of doctrinal change. "In order to ensure that a doctrine permeates a military organizations, it must be taught throughout the organization's school system" (DeVries, 1983, p. 30). Along with the history program, writing program, and common core, TRADOC directed that service schools ensure that their programs of instruction followed AirLand Battle doctrine. This was a major revision effort for some schools, for example the Command and General Staff College, and relatively minor at others. At the staff college, tactics exams were no longer graded against a school solution which the active defense doctrine allowed with its very precise data for weapons placement and force ratios. The tactics exams, both offense and defense, were

graded based on the feasibility of the student's operations plan and rationale for that plan. Thus, there was an increased emphasis on thinking and creativity using Airland Battle doctrine and the tests measured these factors. DeVries (1983) writing on the requirement to instill maneuver thinking, stated that the history of the three decades prior to the adoption of AirLand Battle doctrine demonstrated that simply erecting a new doctrine without an intense effort to redirect thinking is meaningless.

The New Organization Training Team (NOTT), from Fort Leavenworth, Kansas, in 1982 briefed all active Army divisions about doctrinal and organizational changes. This team spent a week at each Army division, starting with a briefing to the division commanding general on Monday morning and finishing Friday after all company commanders and first sergeants had been briefed. The Army used New Equipment Training Teams (NETT) and other briefing teams to communicate doctrinal, training, organizational, and equipment changes to the field Army. Briefing slides were used a guides to organizational actions until formal doctrinal and training literature products were available. There were no evaluations of the effectiveness of these teams. However, many of the latter teams appeared to be successful because the units being briefed paid for the briefing teams' travel. Overall, the volume of briefing teams and units' command interest in being briefed suggest that the teams were effective dissemination media.

Simulations, both manual and computer-driven, were developed and distributed to the field Army. These simulations allowed units to practice the application of the latest doctrine against a realistic threat force. The real value of these simulations was that they provided a means to provide effective feedback on performance to soldiers in training.

CHAPTER V

Conclusions and Recommendations

Purpose of the Study

The purpose of this study was to examine the organizational learning dynamics of doctrinal change in the United States Army from 1976 to 1986, specifically the formation and implementation of AirLand Battle doctrine.

Conclusions

Was AirLand Battle doctrine an effective doctrine for waging land warfare? According to Colonel Harry Summers (1991), AirLand Battle doctrine restored the Army's soul after Vietnam and was the blueprint for success in *Operation Desert Storm*. The fact that the revisions of AirLand Battle doctrine in 1976 and 1993 were still called Airland Battle, and maintained the original concepts, provides added weight to the argument that the doctrine was perceived as effective. Further, the two revisions followed the same doctrinal development process used to develop the 1982 manual. If one accepts Herbert's (1988) premise that doctrine is the Army's choice about how to wage warfare,

there is sufficient evidence that Airland Battle was perceived as an effective decision.

Effective doctrine is a temporal construct. It is organizational choice based on current circumstances, but it can provide a path to future success. An Army, like other organizations, is a capability entity. It can accomplish different tasks in different ways based upon the mission and resources provided. Thus, doctrine is organizational self-determination. AirLand Battle doctrine permitted the United States Army to define itself as an organization of thinking warriors who could use stratagems as well as force to win. Victory became the definition of success in lieu of destruction of the threat. Victory without fighting a battle became the ultimate objective.

The AirLand Battle doctrine became a mental model for officers to use in determining courses of action on the battlefield and in choosing the best one. Because the AirLand Battle doctrine showed officers <u>how</u> to think, not <u>what</u> to think, it allowed creativity in both the preparation and execution of land warfare. This creativity was used by Army leaders to justify the acquisition and application of new technology to enhance Army performance.

Effective doctrine is temporal; it is important to determine if it fits in its time. A critical input change to the Army was the adoption of the all-volunteer concept in the 1970s and a career force by the 1980s. This meant that the Army generally was staffed with people who had chosen

the Army as a career. AirLand Battle doctrine suited this force because the investment in training to teach people how to think would not be wasted. With a career force, the return on investment for training was increased due to decreased turnover. The Active Defense doctrine was based on DePuy's perception of a draftee Army that would have to be told specifically what to do since they were in the Army for a short period.

Another temporal issue and input that supported the doctrine was increased funding. President Reagan campaigned on the requirement for a strong defense and supported this with an increased military budget. The offense generally costs more than defense and the AirLand Battle doctrine was more offensively oriented. There is almost a "chicken or the egg" conundrum here in determining whether increased resources provided the opportunity for the new concept or whether the concept drove the resource allocations. Whatever the case, AirLand Battle doctrine fit its temporal environment.

The doctrinal development process was instrumental in gaining acceptance for the AirLand Battle doctrine. Concern arose about whether doctrine consists of what is formally written or what is practiced in daily behavior. If the new doctrine was to be enacted, it had to be embedded in standard Army practices. This required the active participation of service schools and field commands. The AirLand Battle concept and later, doctrine, was communicated

and staffed throughout the Army. Service schools, very powerful institutions, were active participants in the development process and their involvement provided an added impetus to change curriculums in line with the new doctrine. They did. The field commands had to adapt training to employ the new doctrine. They did, although at a rate perceived by some as too slow. Thus, the doctrine product became an effective Army output as the field Army became adept at its implementation.

The Army's use of a formal model, the Concept Based Requirements System (CBRS), provide; a potentially powerful learning tool. The Army's difficulty with the CBRS model, however, is the inability of officers to deal with intangible concepts without going immediately to solutions. CBRS, like other models, is only as good as it implementation and CBRS can be driven by parochial interests to preconceived goals.

The Kaufman (1992) Organizational Elements Model (p. 48, 91) provides an equally powerful tool, especially the application of the outcomes element which considers all the ramifications of organizational outputs. Models that I researched generally cover only the organizational impact of their outputs, which potentially can be harmful to the larger society, and do not cover the outcomes element: the societal or global impact. According to the Kaufman (1992) framework, it is one thing to produce a product; it is another to produce a product that benefits society. Kotler

(1991) defines this a societal marketing. The implication for the military and national governments is that perhaps the focus should be on the outcome of world peace, an end, not the output of national defense, a means to an end. For individual businesses, the focus should be on how their products and outputs improve our society and world, not just make a profit.

Did the Army Learn?

The following discussion shows the manifestation of learning in each subprocess according to the Dixon (1992) model and therefore, some of the learning dynamics. One can conclude that learning did occur. The previous discussion in this chapter suggests that the learning was effective.

The Army acquired information from a multitude of sources. It acquired information both from internal sources, such as its own experience in failing to justify weapons procurement, and from external sources, such as staff talks with sister services and allied armies. Other internal sources were the personal experiences of Army members, U. S. Army history, and learning from previous doctrine development processes and ensuing implementation. Other external sources included wars not involving U. S. forces and exchange officers. Because of the Concept Based Requirements System (CBRS), much of this information

acquisition was focused on the intent to gain knowledge and apply it to solve organizational performance problems. What was not considered valid information for the CBRS process, although criteria for CBRS validity was elusive, was filed away, if it was ever written.

The Army did distribute the information that it acquired and perceived important. There were intentional activities such as the Army Doctrinal and Training Literature Program, training at Army service schools, journal articles, formal briefings, and other fora. There were unintentional information distribution activities such as transfer of people, "war stories" about various Army activities, and informal communication among Army members.

The Army made meaning of this information through various action processes such as wargaming simulations and field exercises. These exercises in turn generated additional information which created a loop of information creation and interpretation. The Tactical Engagement Simulation (TES) technology enabled the Army to conduct very realistic war games and measure the efficacy of various methods. Engagement simulations enhanced the Army's ability to measure effectiveness, when compared to the arbitrary rules used prior to engagement simulation. As a result of this interpretation process the Army discarded invalid methods and created new ones. Because of the equivocality of some information gathered, the Army had vigorous discussions, both in informal fora and in professional

journals, on the meaning of the information gathered. One example is the debate on the impact of technology on maneuver warfare.

Once the Army had interpreted the information, the information internally was applied formally to Army doctrine, structure, training programs, and materiel requirements. The written records articulated the rationale for the changes and generally were available Army-wide, except for classified material. Further, the new "lessons learned" became part of the informal, unwritten body of war stories.

The information was available for retrieval from organizational memory by making use of written records and from questioning individuals and groups. Soldiers also learned Army culture and lessons through the Army's initial entry training process. The intent was to make this information second nature to soldiers and accessible upon demand to increase the probability of survival on the battlefield.

The preceding five paragraphs outline how the Army accomplished each element of the Dixon (1992) organizational learning model and therefore learned. However, the existence of organizational learning, by itself, does not determine if the learning was effective. The doctrinal development by France and Germany prior to World War II provides support for this argument. Between World War I and World War II both Germany and France developed doctrines to

prepare their nations for future wars. France lost its war in 1940 and its status as a world power because its doctrine was inadequate, while the German doctrine was found to be highly effective.

The United States Army did organizationally learn and various evidence supports the conclusion that the learning was effective. Army experiences at the National Training Center, where the doctrine was tested in live combat scenarios with lasers rather than bullets, seemed to show that the doctrine was feasible. Of course, there were continual fixes in specific techniques, but the overall doctrine appeared to work. Further, computer simulation testing showed that the doctrine was capable of producing victory. The 1986 revision of AirLand Battle Doctrine did not change the basic premise of the 1982 version. The continued support of the 1982 version in the 1986 manual and 1993 manual appeared to validate the effectiveness of the doctrine. Also, the doctrinal development processes for the 1986 and 1993 revisions appeared to validate the 1982 process.

Thus, the organizational learning dynamics for an organization learning a new method to accomplish its mission includes understanding the mission, determining the need for change, acquiring or creating information about alternatives, interpreting the information, choosing the most valid information, and sharing this information, with

sufficient richness to allow for understanding, throughout the organization.

Synthesis of Conclusions and Literature

Organizational learning has merit for effective organizational behavior if it is focused toward accomplishment. The critical element is that the learning must support organizational objectives and or the adjustment of objectives. Learning, by itself, is neutral unless it is linked with results.

The issue of organizational learning agents generally is not covered in the literature; however, I would like to suggest that this issue is a function of duty position within an organization. The literature supports the proposition that the Commanding General, TRADOC, and other commanders act as learning agents and direct work on doctrinal revisions. However, since U. S. Army actions are recorded as coming from the commander, the written record may not provide sufficient data to support this position. Chief executive officers and chief operating officers are corporate analogs. Hedberg (1981) cites works which state the role of senior executives to initiate organizational learning. It may be that these people, responsible for overall organizational performance, are best situated to

start, support, and direct organizational learning toward products, outputs and outcomes.

Recommendations for Further Study

Additional study is required to determine the requirements for effective organizational learning. What are the characteristics and elements that separate the successful from the unsuccessful? The study of organizational learning promises much, but before it can be implemented successfully, the issue of success or effectiveness must be decided.

Further study is required to determine the difference in organizational learning characteristics from one organization to another. What are the managerial practices, organizational structures, communications systems, and strategic planning processes that support effective learning? Since organizations operate within a ecology of learners (within an environment of other organizations adapting and learning), there remains the issue of rate of learning and learning commensurate with, if not exceeding, other organizations. How does an organization determine that its rate of learning is equal to, or greater than, its competitors? The benchmarking process is potentially hazardous because an organization can benchmark without taking account of other organizations' improvements and

future product offerings or the validity of their missions (IBM circa 1989).

There is a continuing requirement to determine when individual learning becomes organizational. The Army uses the term lessons learned quite freely when, in many instances, the better terminology would be lessons observed. Many of the lessons learned from the mobilization phase of *Operation Desert Shield* were repeats from earlier mobilization exercises which had not been corrected. In short, the learning was not organizational.

A requirement to determine measures of learning is still valid and gains increased importance as a means to differentiate behavior among firms and to differentiate learning from unreflective change. If one is to determine efficiency of learning, the measures applied will be the most contentious issue.

The issue of information overload and the rules for making meaning require added study. What is the impact of technologically-based memory systems such as multimedia applications and fuzzy logic databases. Are these technologies assisting in solving problems or causing new ones? Further, how do organizations intentionally make frames for learning and who should share in their development and use? How do organization develop organizational memory and then make accessible to all? The charge that organizations do not know all they know is still valid.

There is a requirement to conduct similar studies to this one to determine if the results from this study are applicable to business firms. Is there a doctrinal equivalent in other organizations, or does this study suggest that a form of written doctrine would be valuable to non-governmental firms?

Implications for Human Resource Development

Since human resource development departments generally are the organizational agents usually tasked to support learning, the concept of organizational learning provides new opportunities. The disciplines of organization development and training and development, both within the human resource development field, are affected. How to develop human resources and design an organization around the construct of a learning organization must be determined. Some work already is being done, but there are few examples of leaders directing their firms to become learning organizations (especially societally focused). Perhaps that is because the construct is relatively new and that HRD practitioners are not prepared nor understand the requirement to facilitate valid organizational learning.

Along with preparing the organization for organizational learning, preparing the human resource development practitioner is another issue. The practitioner

should have sufficient knowledge in other disciplines such as organization theory, administrative science, organization behavior, and information systems management, for example, to successfully implement organizational learning. Academic curriculums both in business schools, for business majors, and in schools which contain the human resource development department, for HRD majors, should include organizational learning offerings and the OEM paradigm shifts. There is some work being done in professional HRD societies to support this new field, however.

Final Thoughts

Although this study suggests that the Army learned effectively in developing AirLand Battle doctrine, comments from a victorious enemy cautions against complacency. General of the Army, Vo Nguyen Giap, military leader of the North Vietnamese forces during the French and United States military involvement in Vietnam states that imperialists are bad pupils. "They are bad pupils because they don't learn from experience; they continue their errors. They don't understand" (Simpson, 1991, p.50). He added that superpowers must learn that there are limits to power. Giap supports this by stating that is why one must study history, to learn.

Juxtaposed to the above cautionary note, a more hopeful thought is that organizational learning holds great promise as a means to bring organizations into the information-laden next century. Organizational learning potentially can provide a means to use all human resources more meaningfully by engaging human minds creatively, not just their backs with unreflective, repetitive behaviors. Learning is a most human behavior and participating in organizational learning may provide the opportunity for inclusion in organizations, and in a society, where exclusion is becoming the rule.

Since this paper started with a global learning challenge, it is suitable to conclude with a similar challenge to collective learning.

> Evolutionary theory, on the other hand, suggests that each species--including the human--must be responsible for its own survival; there is no supernatural protector who will save it. Although we have hardly had the time to assimilate this bleak intelligence, we are already forced to make decisions that will affect the survival of life on the planet...We need (sic) to take our predicament seriously, and develop the knowledge that will make a creative response to it possible (Csikszentmihalyi, 1993, p. 13).

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